AD-A124 534 A COMPARISON OF FORECASTED AND ACTUAL FLYING PROGRAMS FOR CY 1973-1979(U) DECISION SYSTEMS BEAVERCREEK OH W S DEMMY OCT 80 WP-80-06 F33600-80-R-0314 1/1

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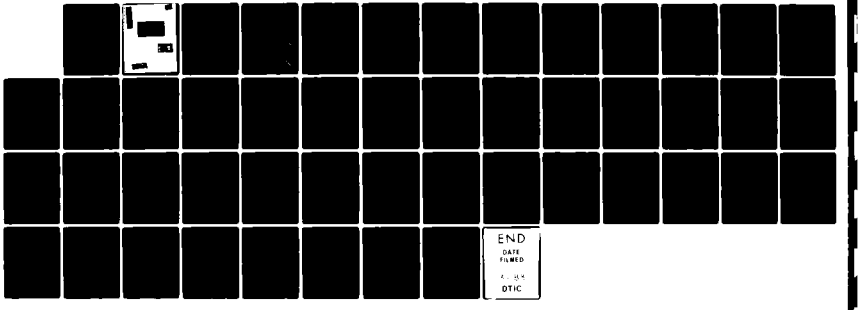

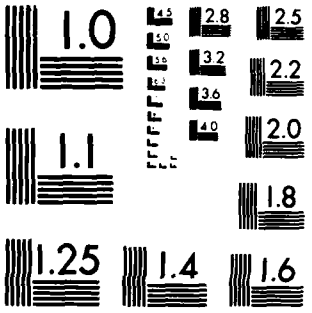

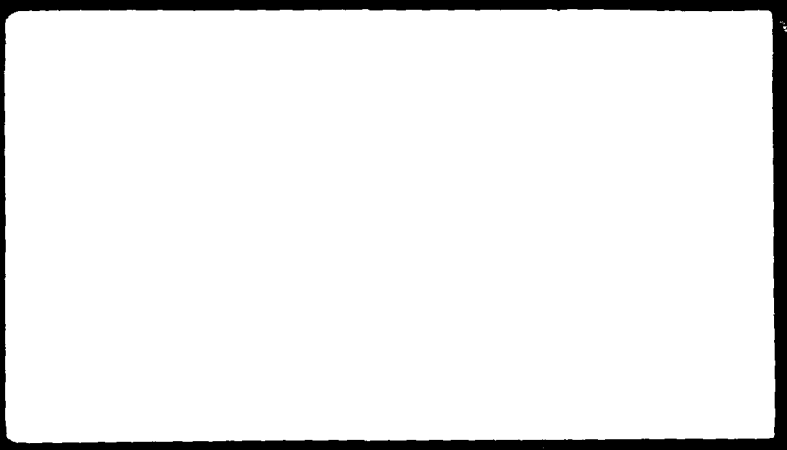

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(1)

A Comparison of Forecasted and Actual Flying Programs for CY 1973-1979

by

W. Steven Demmy

October 1980

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Decision Systems
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18. ABSTRACT (UNCLASSIFIED) This paper compares 12 month forecast of USAF flying activity with the corresponding actual flying programs, i.e., the programs that were eventually flown. The data covers the forecasts made in the interval CY 73 - CY 79.

19. CONCLUSIONS (UNCLASSIFIED)

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21. IMPLEMENTING ACTIONS (UNCLASSIFIED)

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This paper compares 12-month forecast of USAF flying activity with the corresponding actual flying programs, i.e., the programs that were eventually flown. The data covers forecasts made in the interval CY 73--CY 79.

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Introduction

Predictions of future flying program activity are critical elements in the requirement computations for both reparable and consumable items. In both of these requirements computations, it is assumed that:

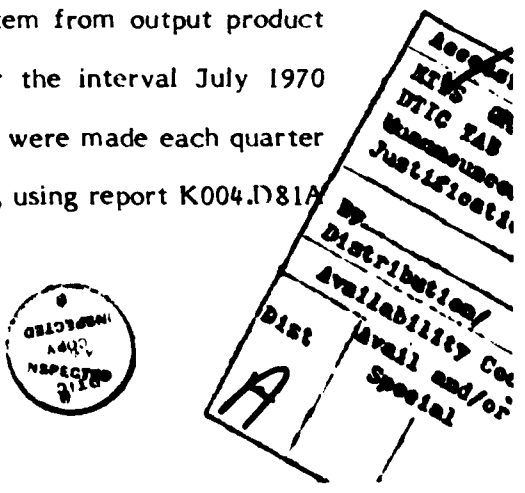
1. Demand is proportional to flying program activity, and

2. It is possible to accurately forecast the flying activity to be performed in future periods.

In this paper, we use historical data for calendar years 1973 through 1979 to test the second assumption. That is, we compare forecasts of flying program activity made during these years to the actual flying activity which was eventually performed. In the next section, we discuss the sources of data used in our computations more fully, and describe the calculations used in comparing predicted and actual flying programs. In the appendix, we present plots for 26 USAF aircraft describing both program activity and forecasting accuracy observed during this time interval.

Data Sources

We obtained the data documented in this report from two major sources. Observed aircraft flying program data was obtained from the G033J system from output product A-G033J-PAR-M1-MMO. This information was collected for the interval July 1970 through June 1979. Predictions of flying program activity which were made each quarter throughout the 1970s were obtained from the K004 data system, using report K004.D81A



RCS: NR-LOG-LR(AR)7208. Appendix A of reference 1 presents the actual program activity data obtained in this process, while Appendix B of reference 1 presents the forecasts of 12 months flying activity obtained from the K004 system. Table I illustrates the data presented in Reference 1. The top of Table I presents the actual flying program activity for B-52 weapon systems by quarter for CY1971 through 1979. Similarly, the bottom portion of Table I presents the predicted one year B-52 flying programs in hundreds of hours. These predicted hours are the total flying hours predicted to be flown during the succeeding 12 month period. For example, at the beginning of the first quarter of CY 1973, Air Force planning documents were predicting a total of 230,800 hours of B-52 flying activity for the next 12 months, i.e., for quarters one through four of CY 1973. Each quarter the flying program forecasts are updated. At the beginning of quarter two of CY 1973, the revised 12 month forecast of B-52 flying activity (for quarters 2, 3, and 4 of CY 1973 and quarter 1 of CY 1974) was 211,900 hours. Other revised forecasts are presented in the table, with each forecast representing a prediction for the future 12-month interval.

We next computed the ratio of predicted to actual flying programs for the B-52 and a number of other USAF weapons. We refer to this number as the "forecast accuracy ratio." Table II illustrates this computation. For example, at the start of the first quarter of CY 1973 (Quarter No. 9), a total of 230,800 hours were forecast as the B-52 flying program for the next 12 month period. As it turned out, a total of 203,703 hours were actually flown by B-52 aircraft during this interval. The ratio of the predicted to actual hours is 1.133, the number shown in the right hand column of Table II. That is, the predicted program was 13.3% more than the hours that were actually flown. Similarly, when the 12-month forecast for the second quarter of CY 1973 was divided by the corresponding actual hours, a program ratio of 1.220 was obtained. The right hand column in Table II presents similar ratios associated with other forecasts of B-52 flying programs made throughout the 1970s.

Table I.

B52 Actual Flying Program, CY1971-79
(Hours)

MDS	YR	QTR 1	QTR 2	QTR 3	QTR 4
B52	71.	[illegible]	[illegible]	31442.00	45488.00
[illegible]	72.	[illegible]	[illegible]	32740.00	38288.00
[illegible]	[illegible]	[illegible]	[illegible]	29547.00	28738.00
[illegible]	[illegible]	[illegible]	[illegible]	29132.00	38402.00
[illegible]	[illegible]	[illegible]	[illegible]	31596.00	32548.00
[illegible]	[illegible]	[illegible]	[illegible]	31812.00	32448.00
[illegible]	[illegible]	[illegible]	[illegible]	30247.00	33623.00
[illegible]	[illegible]	[illegible]	[illegible]	30857.00	32099.00
[illegible]	79.	[illegible]	33857.00	32082.00	31787.00

Predicted 1-Year B52 Flying Programs, CY1973-79
(100's Hours)

MDAP	YR	QTR 1	QTR 2	QTR 3	QTR 4
B52	73.	2308.00	[illegible]	2082.00	1949.00
B52	74.	1868.00	[illegible]	1740.00	826.00
B52	75	1518.00	[illegible]	1406.00	1510.00
B52	76.	1422.00	[illegible]	1383.00	1364.00
B52	77.	1359.00	[illegible]	1356.00	1339.00
B52	78	1332.00	[illegible]	1328.00	1340.00
B52	79.	1338.00	[illegible]	1321.00	1321.00

Table II.

Forecast Accuracy Ratio's

			ACT 4 QTRS	RATIO QTR [illegible]	[illegible]	[illegible]
B52	QTR	9	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	10	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	1468[illegible].	[illegible]	[illegible]	[illegible]
B52	QTR	12	142[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	16	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	17	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	19	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	22	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	27	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B52	QTR	34	[illegible]	[illegible]	[illegible]	[illegible]

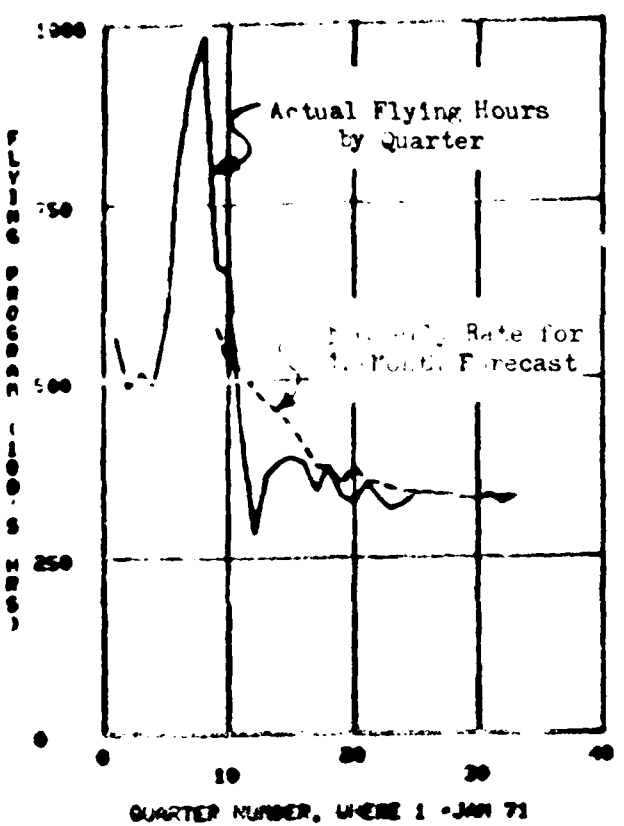
Figure 1 plots of the actual and predicted flying programs for the B-52 for CY71-79, as well as the forecast accuracy ratios presented in Table II. The solid line in Figure 1A represents actual quarterly B-52 flying activity, while the dashed line in this figure represents the corresponding predicted program normalized to a quarterly value. On the other hand, Figure 1B plots the forecast accuracy ratio associated with these observations. As seen in these figures, the predicted flying program was generally above the observed program, although the forecast error became much smaller during the latter years of the 1973-1979 interval.

We developed similar curves for the 26 USAF aircraft associated with the INSSIM D062 Data Bank. These curves are presented in Appendix A. As observed in Reference 1, almost all of these weapons show significantly declining programs throughout the 1970s. Some of the weapons completely phased out of the USAF inventory. In this case, the very small number of actual flying hours resulted in forecast accuracy ratios which were quite erratic.

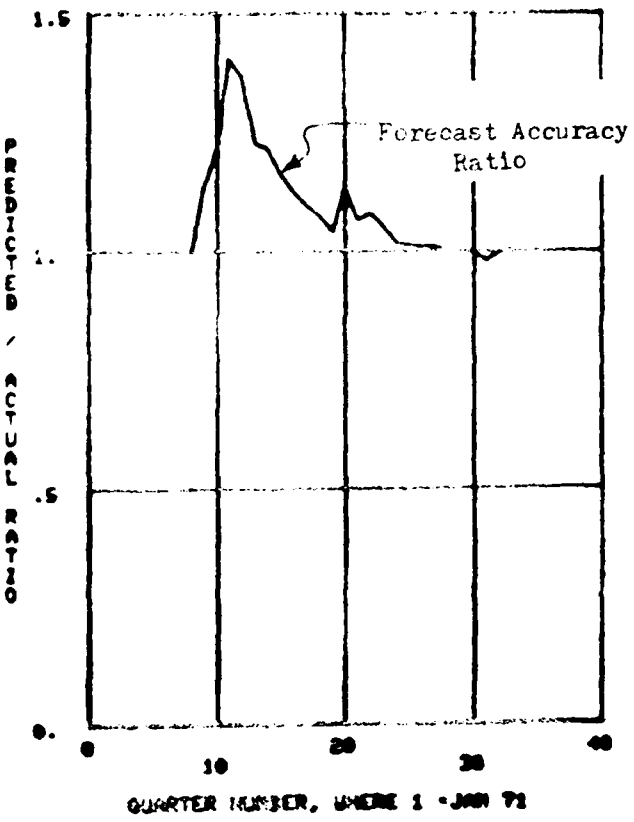
Analysis of Variance

We were interested in testing the hypothesis that forecasting accuracy differed among weapon systems, and that forecasting performance changed as a function of time. To do this, we utilized the data presented in Appendix A to develop Table III. In this table, we have recorded the forecast accuracy ratio associated with the specific flying program forecast made at the beginning of each calendar year from 1973 through 1979 for each of the aircraft in our data file. We then used this data to compute the average forecast accuracy ratio and the coefficient of variation of these ratios for each weapon and for each calendar year. As shown in the figure, the grand average of all these forecast values was 1.12, i.e., for all of the forecasts made, the predicted program averaged 12% higher then the number of flying hours which were eventually flown.

Figure 1. Comparisons of Predicted and Actual B-52 Flying Programs.



(1A)



(1B)

B52
FLYING PROGRAM FOR CY 71 - 80

Note: Quarter 1 = Jan-Mar. 1971.

Table III. Forecast Accuracy Ratios for CY73 - CY79.

[illegible]	CY73	CY74	CY75	CY76	CY77	CY78	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]*	[illegible]*	[illegible]*	[illegible]	[illegible]
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[illegible]	1.154?	1.052	1.045	.968	.948	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1.085	1.084	1.142	1.594	1.059	1.360	1.047	[illegible]	[illegible]
[illegible]	.806	1.330	1.030	1.008	.983	1.038	.982	[illegible]	[illegible]
[illegible]	[illegible]	1.145	1.000	1.000*	1.000*	[illegible]*	[illegible]*	[illegible]	[illegible]
T33	1.160	1.076	1.226	1.110	1.025	.976	1.004	[illegible]	[illegible]
T37	1.151	1.090	[illegible]	1.128	1.011	[illegible]	1.033	[illegible]	[illegible]
T38	1.125	1.106	1.054	1.089	1.079	[illegible]	1.037	[illegible]	[illegible]
T39	1.200	1.146	1.546	.181	1.130	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1.194	1.127	1.122	1.465	1.178	[illegible]	[illegible]	[illegible]	[illegible]
CT29	1.114	1.134	1.713	1.182	1.189	.951	1.006	1.184	[illegible]
AVERAGE	1.194	[illegible]	1.214	1.157	1.116	1.059	1.026		
C. OF V.	.140	.134	.155	.191	.180	.106	.087		

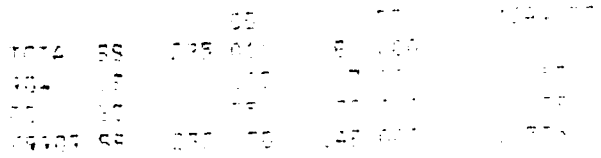
*During these periods, actual flying hours were so low that the accuracy ratios are not meaningful. To prevent these points from biasing our results upward, the true values were replaced by 1.000.

Table IV presents an Analysis of Variance (ANOVA) Table for testing for significant differences in predicting accuracy among weapons and among the different calendar years. This information indicate that there is no statistical basis for concluding that there is any significant differences in forecasting accuracy among weapons or among time periods. That is, it appears reasonable to assume that each forecast accuracy ratio may be considered as a random observation from the same probability distribution. Consequently, we developed a frequency distribution using all of the forecast accuracy ratios presented in TableIV. Our results are presented in Figure 2. As shown in the figure, the combination of all the forecast accuracy ratios have a mean of 1.123, and a standard deviation of .175. The minimum forecast accuracy ratio was .763, while the maximum observed value (after correcting for the outliers as described in the notes to Table III) was 1.812. As shown in the figure, most of the accuracy ratios are greater than one, indicating that the majority of forecasts exceed the corresponding actual flying programs.

Summary

This paper presents statistical data comparing predicted 12 month flying hour programs with the corresponding program hours that were eventually flown. The data covered the interval CY73-CY79 for 26 different USAF aircraft. Most of these aircraft experienced significant program reductions during the CY73-CY79 interval. In general, predictions of flying activity exceeded the number of hours eventually flown. These forecasts averaged 12% above the eventually observed program, though individual forecasts ranged from 76% to 181% of the eventually observed values. Further, a rather crude Analysis of Variance indicates there is no significant difference in forecasts accuracy among weapon systems or among the different fiscal years.

Table IV.
Analysis of Variance Table
for Differences Among Aircraft (Rows)
and Among Calendar Years (Columns)



F(R,E) = .100 -- Not Significant since F(7,148) = 2.08 with 95% confidence.
F(C,E) = .018 -- Not Significant since F(26,148) = 1.60 with 95% confidence.

Figure 2.

Frequency Distribution of
Forecast Ratios, CY 73-79.

```
INPUT data

 1.133 1.027 1.097 1.087 [illegible] 1.00[illegible] 1.005 [illegible] 1.038 1.1[illegible]
 1.37[illegible] 1.[illegible]6 1.272 .34 .644 [illegible] 1.255 [illegible] .45 [illegible] 1.255
 1.172 1.094 1.0[illegible] .985 .972 .998 1.28 [illegible]
 1.104 1.4[illegible]7 1.1[illegible] 1.[illegible]88 .851 1.008 [illegible] .08 .879 [illegible]
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 .955 1.403 .917 .984 1.009 1.0[illegible]4 [illegible] 1.0[illegible]4
 .974 .987 1.037 [illegible]77 1.087 1.026 [illegible] 1.48[illegible]
 .803 1.50[illegible] 1.[illegible]6 [illegible] .985 1.029 1.77[illegible] [illegible] 1.54
 1.052 1.045 .963 .948 .968 .923 [illegible] 1.047 [illegible]
 1.33 1.0[illegible] 1.008 .983 1.138 .987 [illegible] 1.0[illegible] 1.[illegible]
 1.025 .978 1.004 1.[illegible]51 1.09 [illegible] 1.05[illegible]
 1.089 1.038 1.04 1.037 1.2 1.146 [illegible] 1.134 1.127
 1.122 1.465 1.178 1.215 1.034 [illegible] 1.[illegible]
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Variance=  3.08748[illegible]7E-0[illegible]

Std. Dev =  .1757[illegible]6   Coef. of Var. =   [illegible]

Minimum =  .753   Maximum = [illegible]

                    Frequency Distribution

 CELL  UP LIM  CNT
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   1     .60    [illegible]  I
   2     .70    0  I
   3     .80    1  I*
   4     .90    2  I**
   5    1.00   27  I[illegible]
   6    1.10   [illegible]  I[illegible]
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   8    1.30   [illegible]  I[illegible]
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  10    1.50    5  I*****
  11    1.60    4  I****
  12    1.70       I*
  13    1.80    2  I**
  14    1.90    2  I**
  15    2.00    [illegible]  I
  16    2.10       I
```

REFERENCE

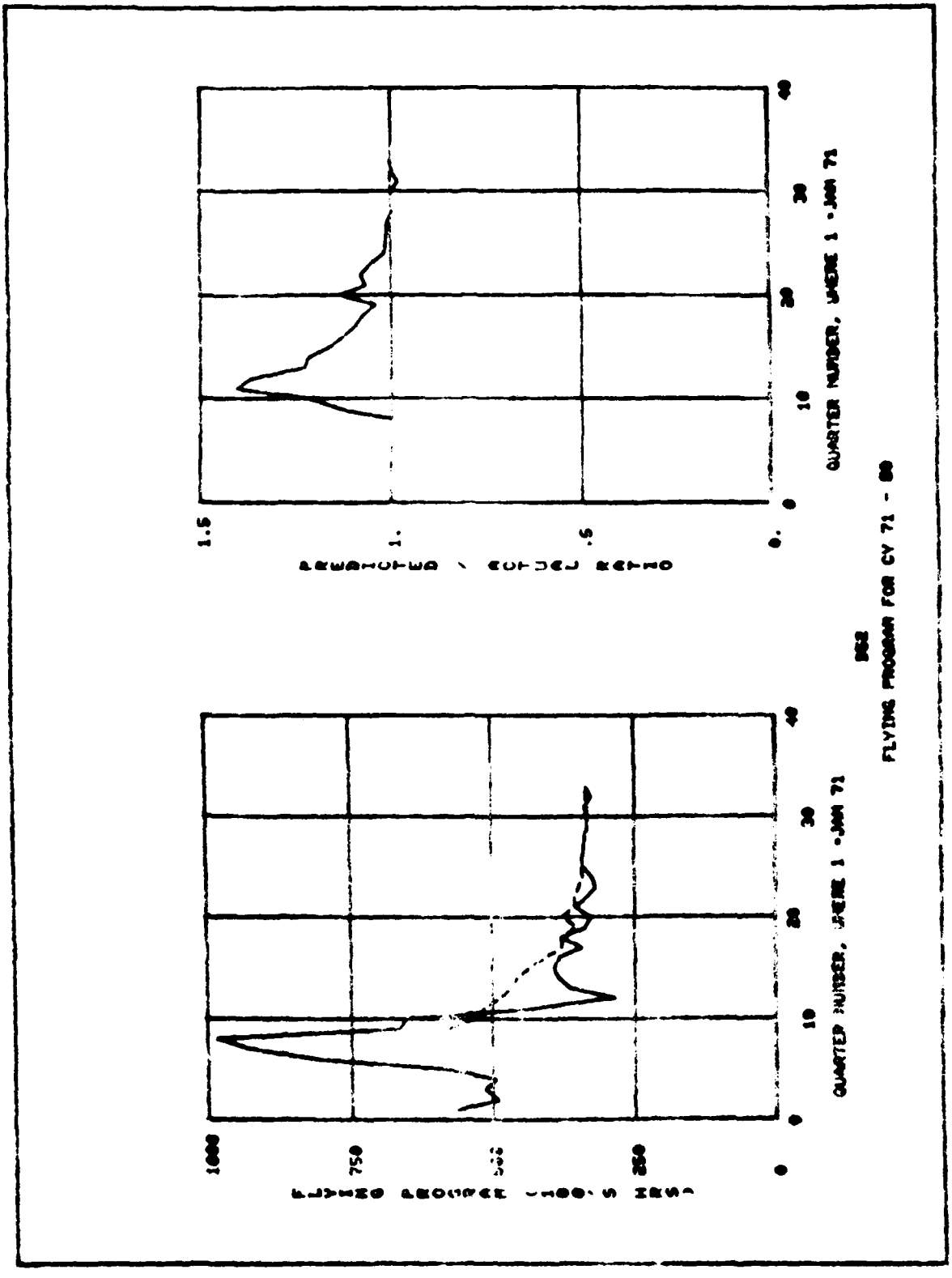
Demmy, W. Steven, Actual and Predicted Flying Program for Selected USAF Aircraft for the Period July 1972 - June 1979. Working Paper 80-01, Decision Systems, 2125 Crystal Marie Drive, Beavercreek, Ohio 45431, June 1980, 54 pp.

Appendix A

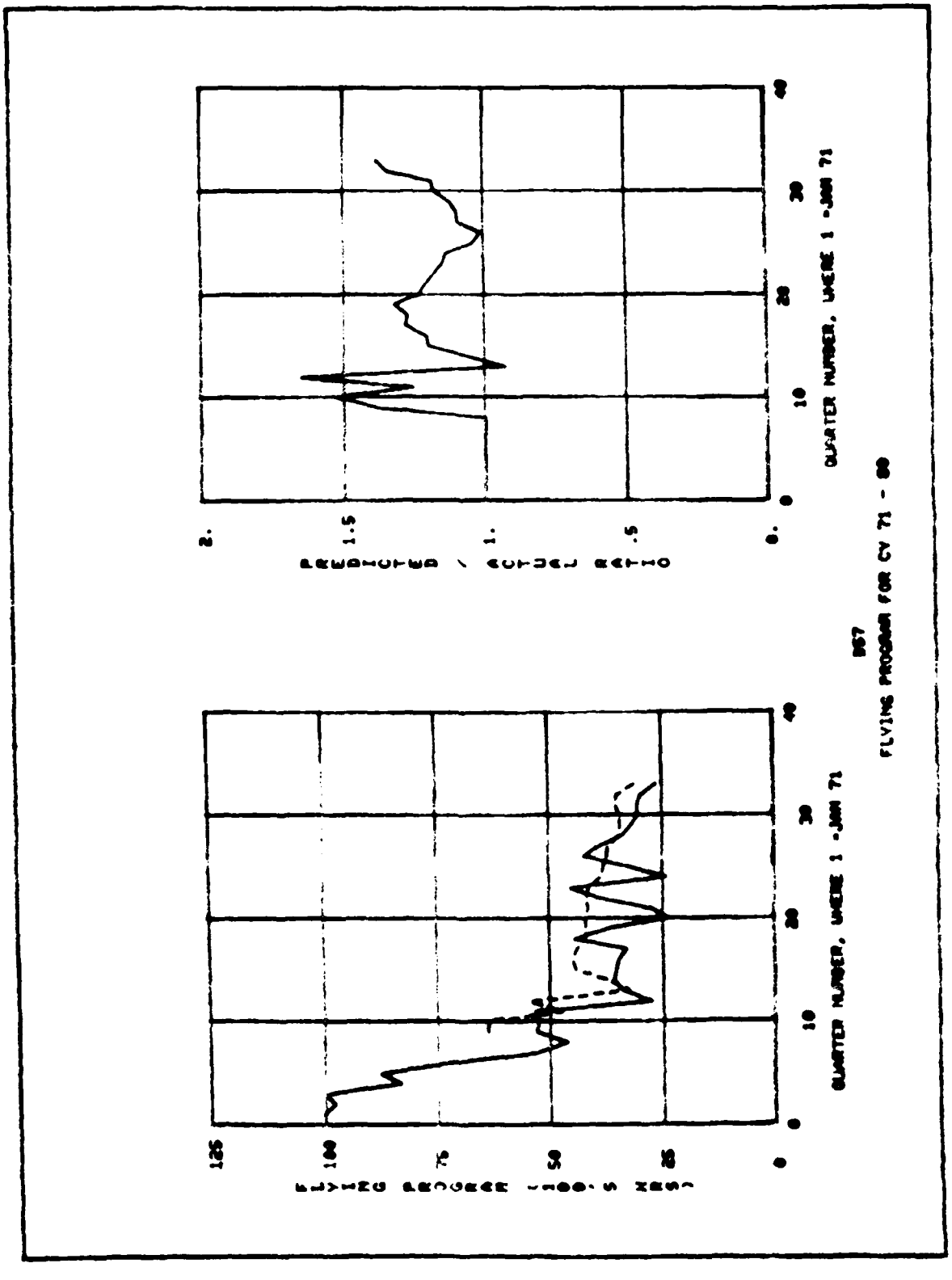
Plots of

Flying Program Forecast Accuracy Ratios

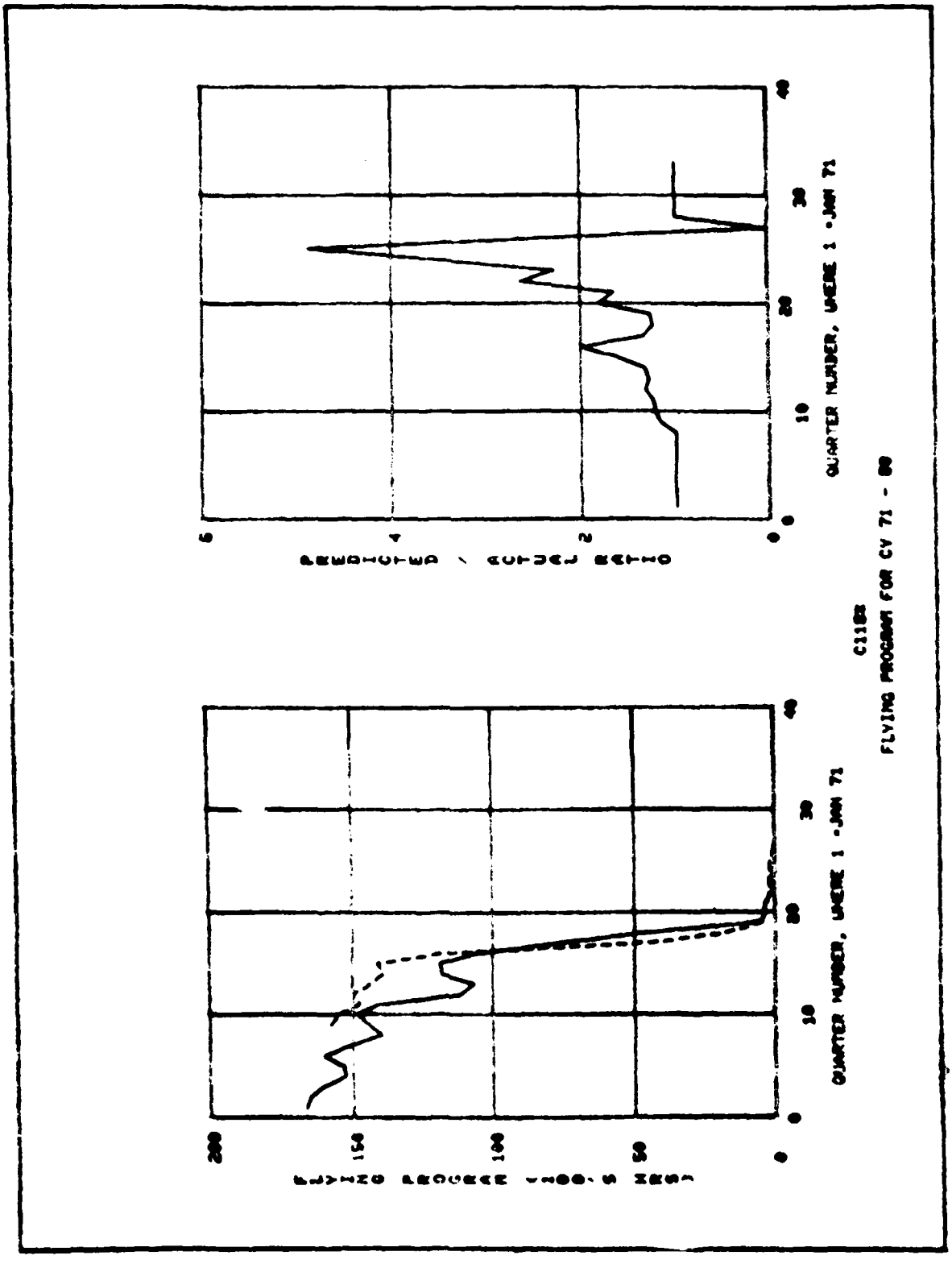
for CY 73-79

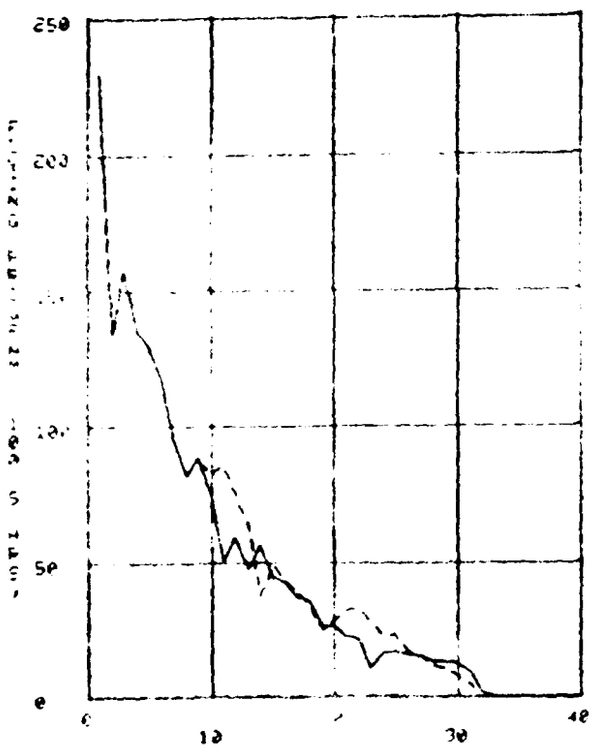


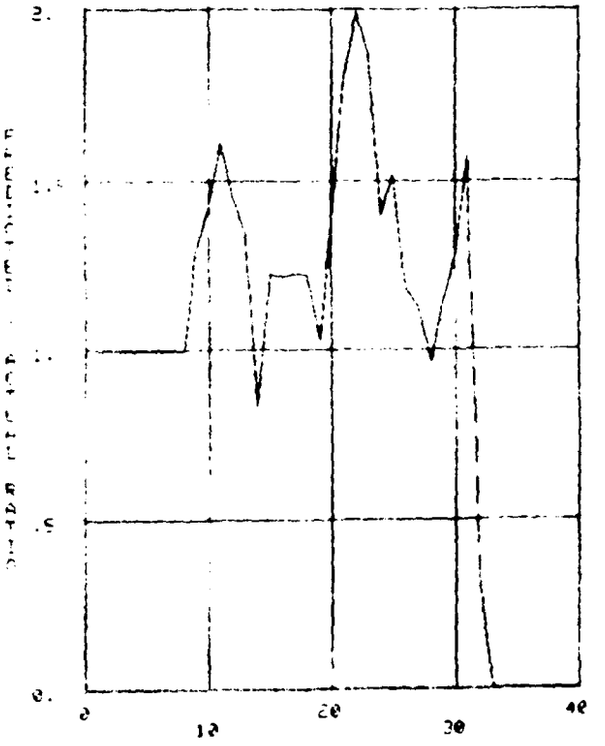
FLYING PROGRAM FOR CY 71 - 80



B57
FLYING PROGRAM FOR CY 71 - 80


QUARTER NUMBER, WHERE 1 = JAN 71
C11ES
FLYING PROGRAM FOR CV 71 - 80
QUARTER NUMBER, WHERE 1 = JAN 71

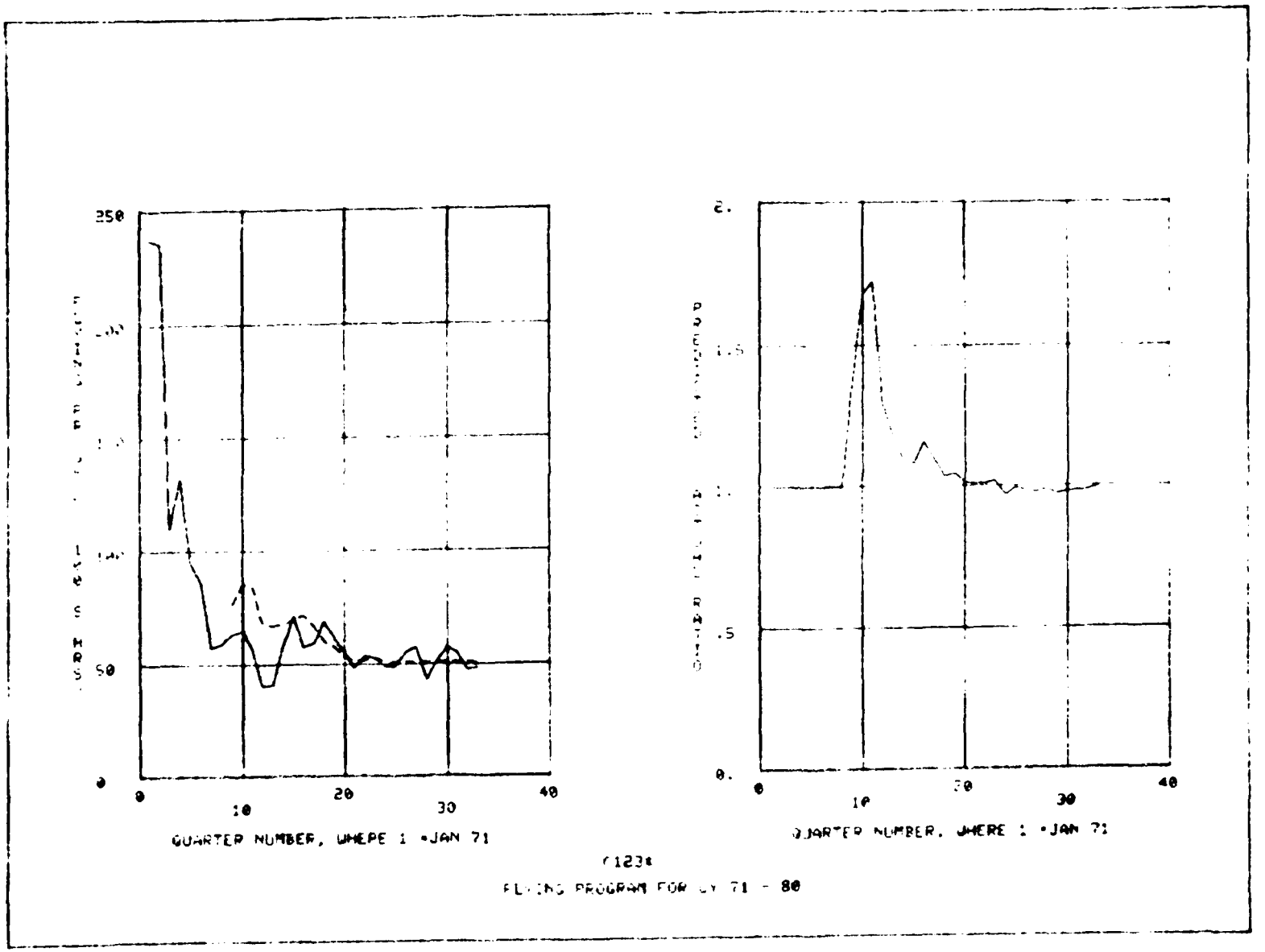




QUARTER NUMBER, WHERE 1 =JAN 71

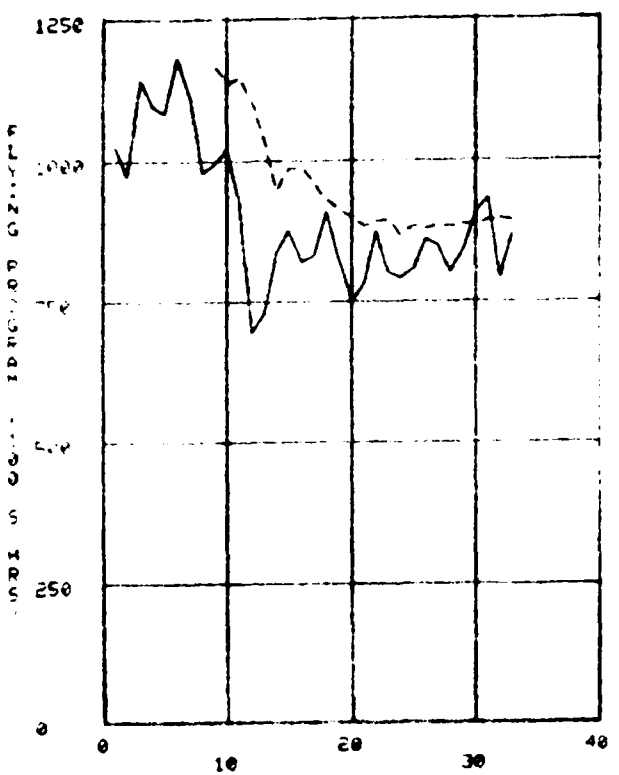
3121*

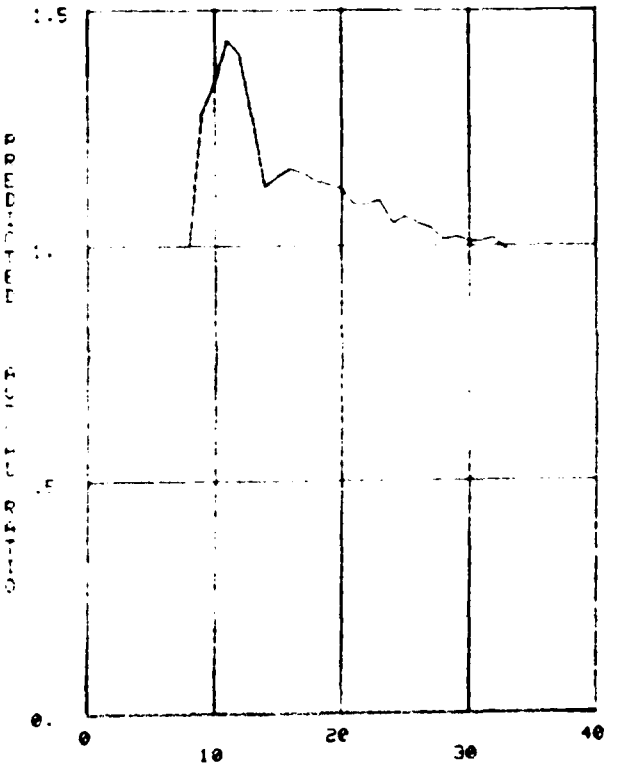
FLYING PROGRAM FOR CY 71 - 80



(123)

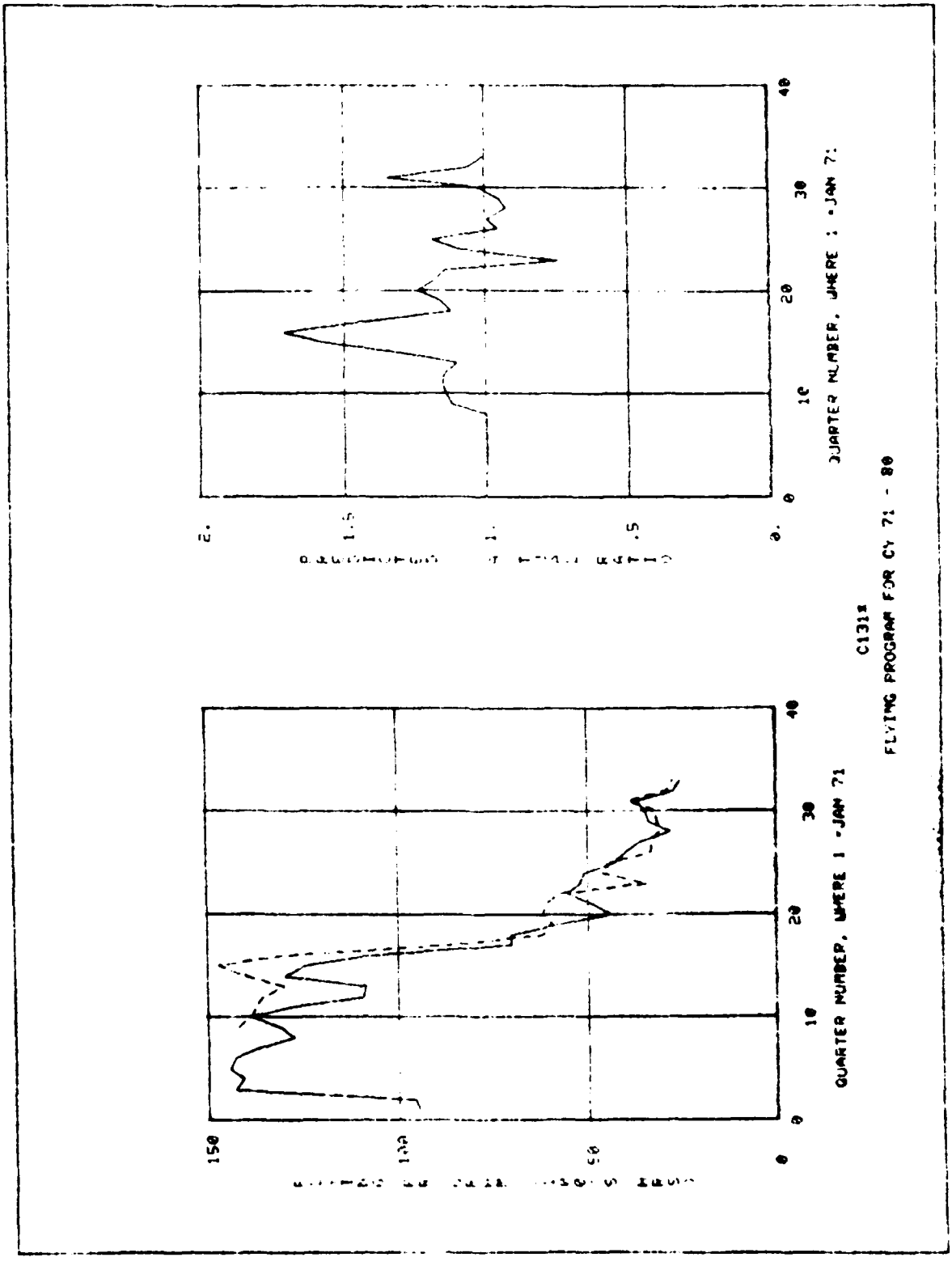
FLYING PROGRAM FOR CY 71 - 80





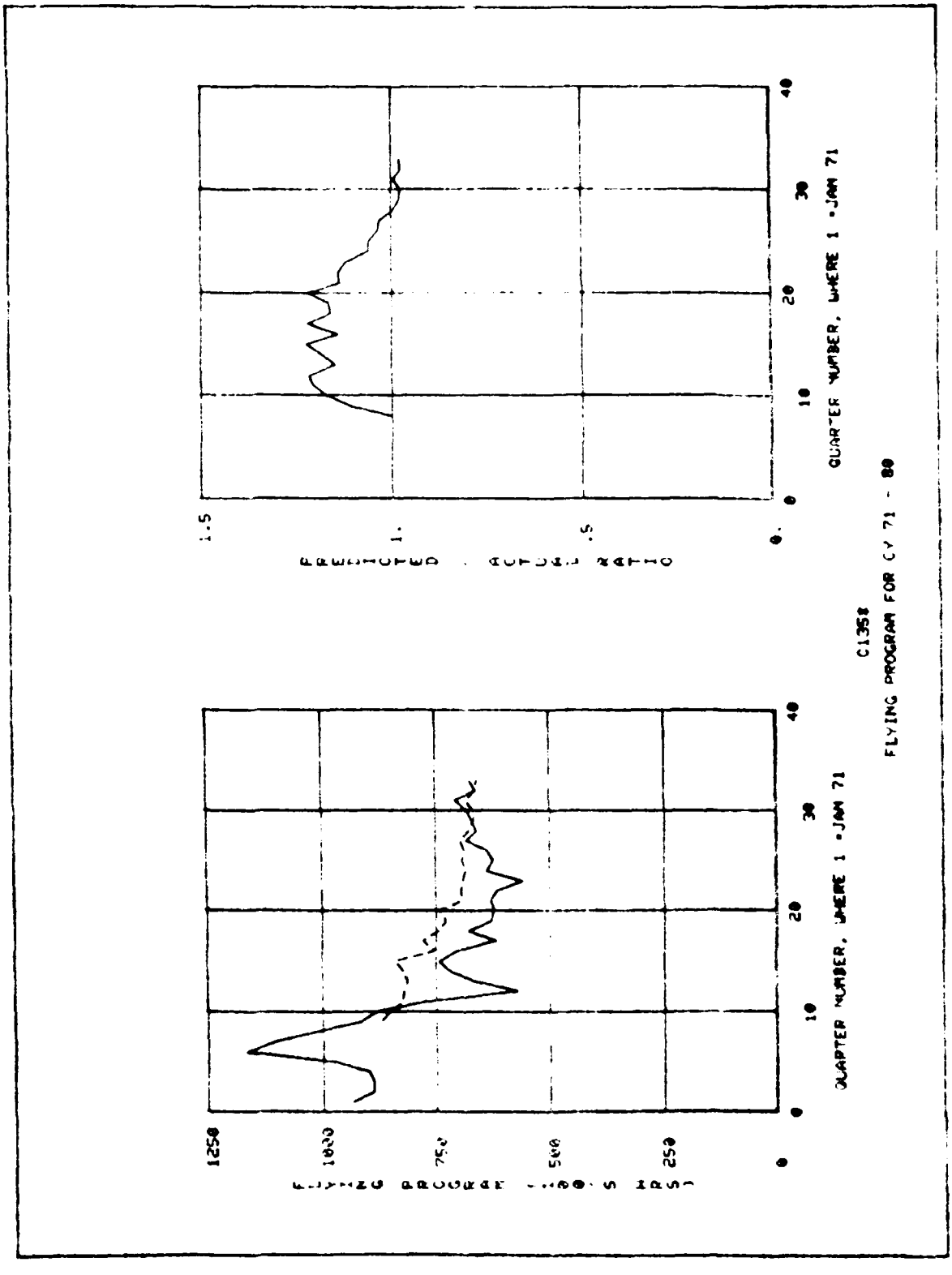
C130X

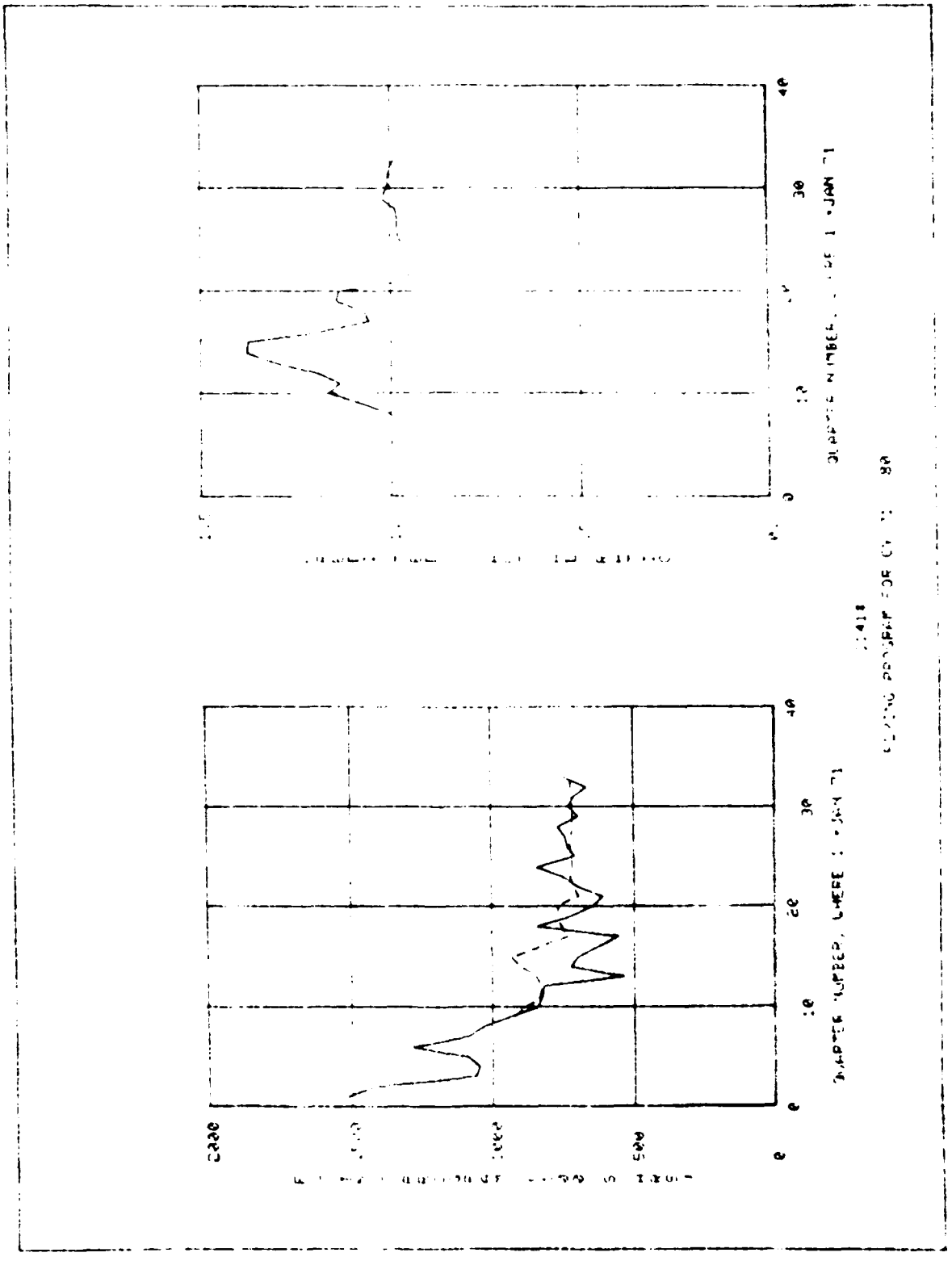
FLYING PROGRAM FOR CY 71 - 80

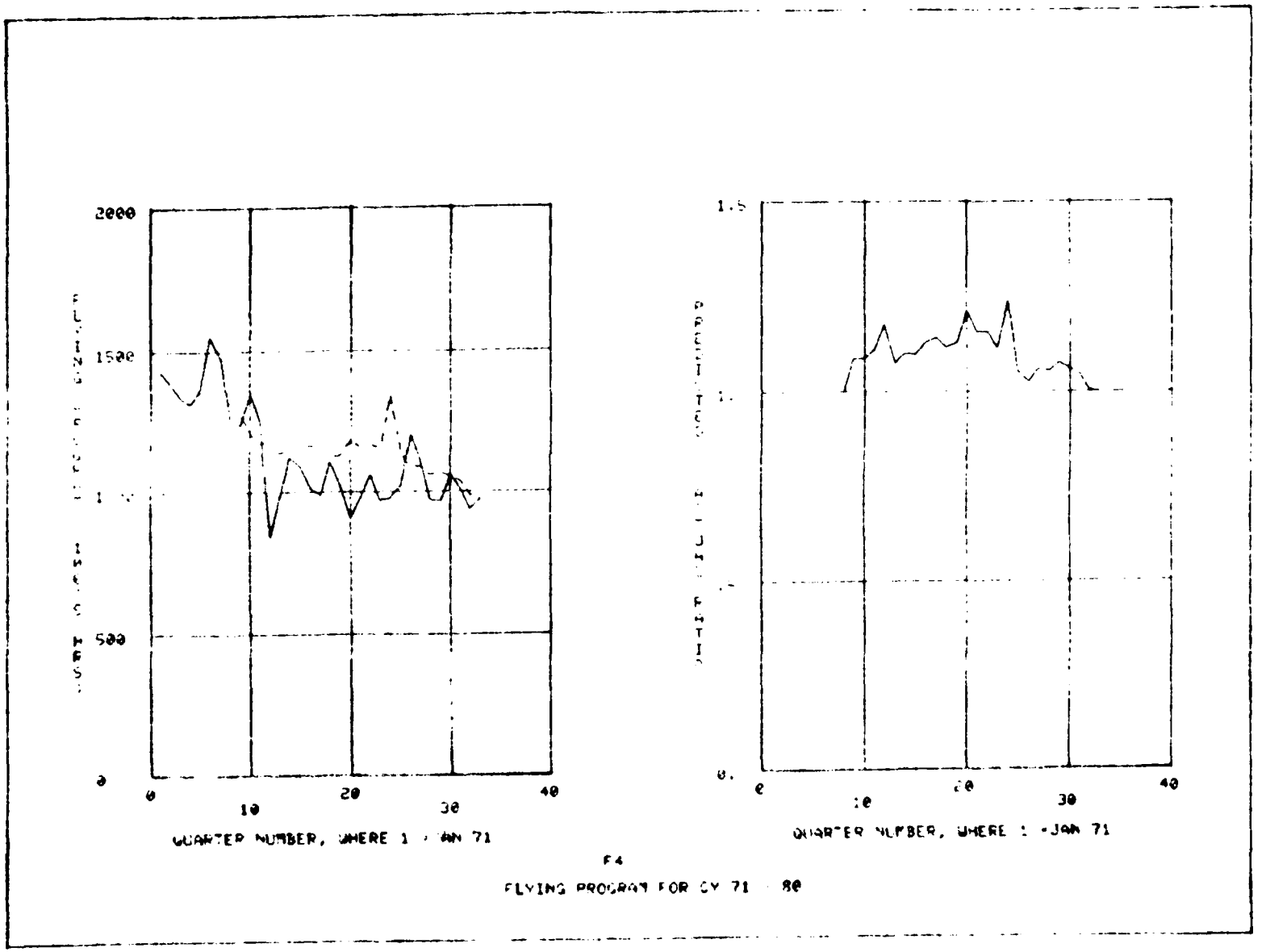


C1311

FLYING PROGRAM FOR CY 71 - 80

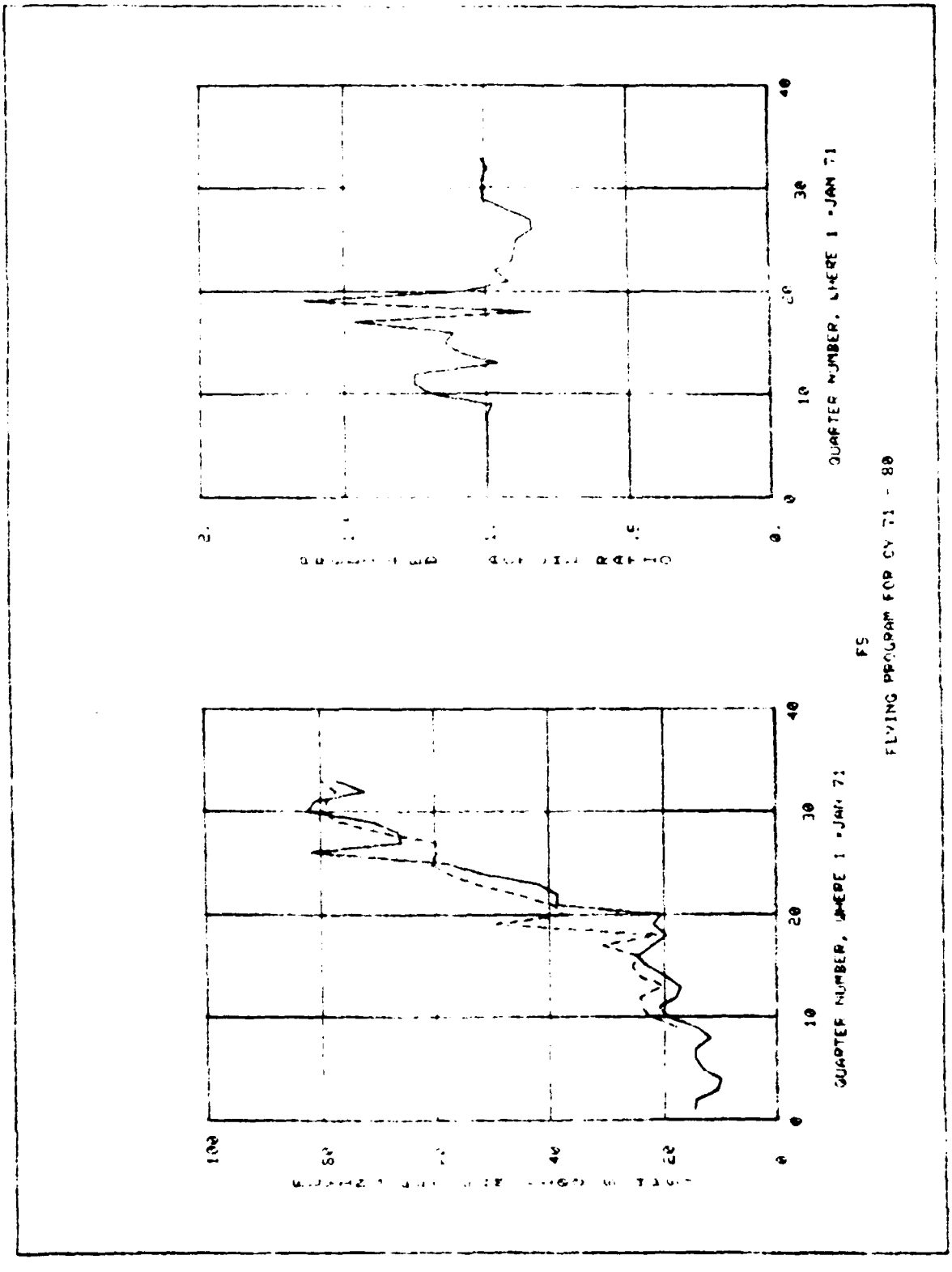

1.5
1.
.5
0.
0
10
20
30
40
QUARTER NUMBER, WHERE 1 = JAN 71
1250
1000
750
500
250
0
0
10
20
30
40
QUARTER NUMBER, WHERE 1 = JAN 71
C135E
FLYING PROGRAM FOR CY 71 - 80





F4

FLYING PROGRAM FOR CY 71 - 80



FS
FLYING PROGRAM FOR CY 71 - 80

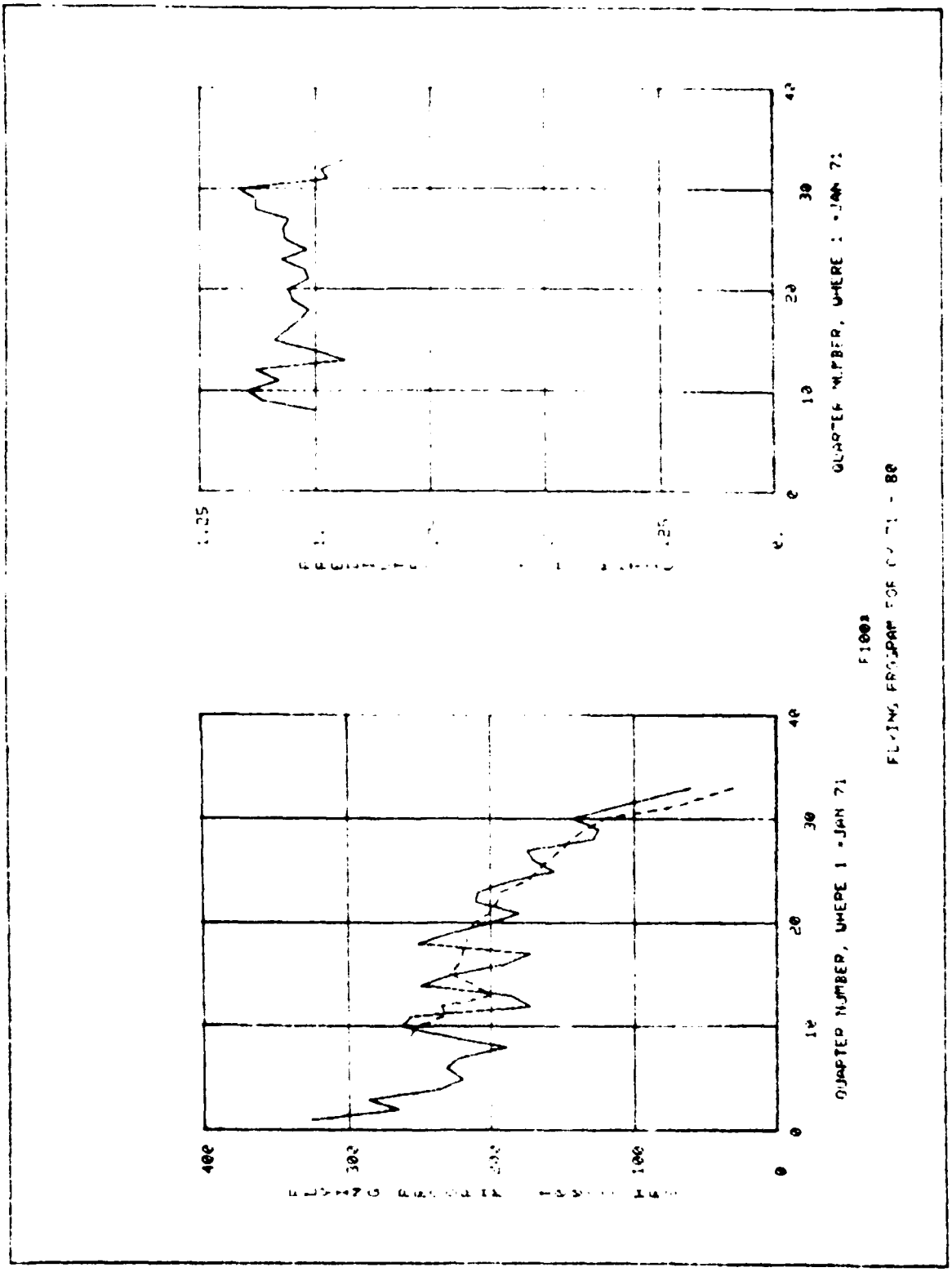
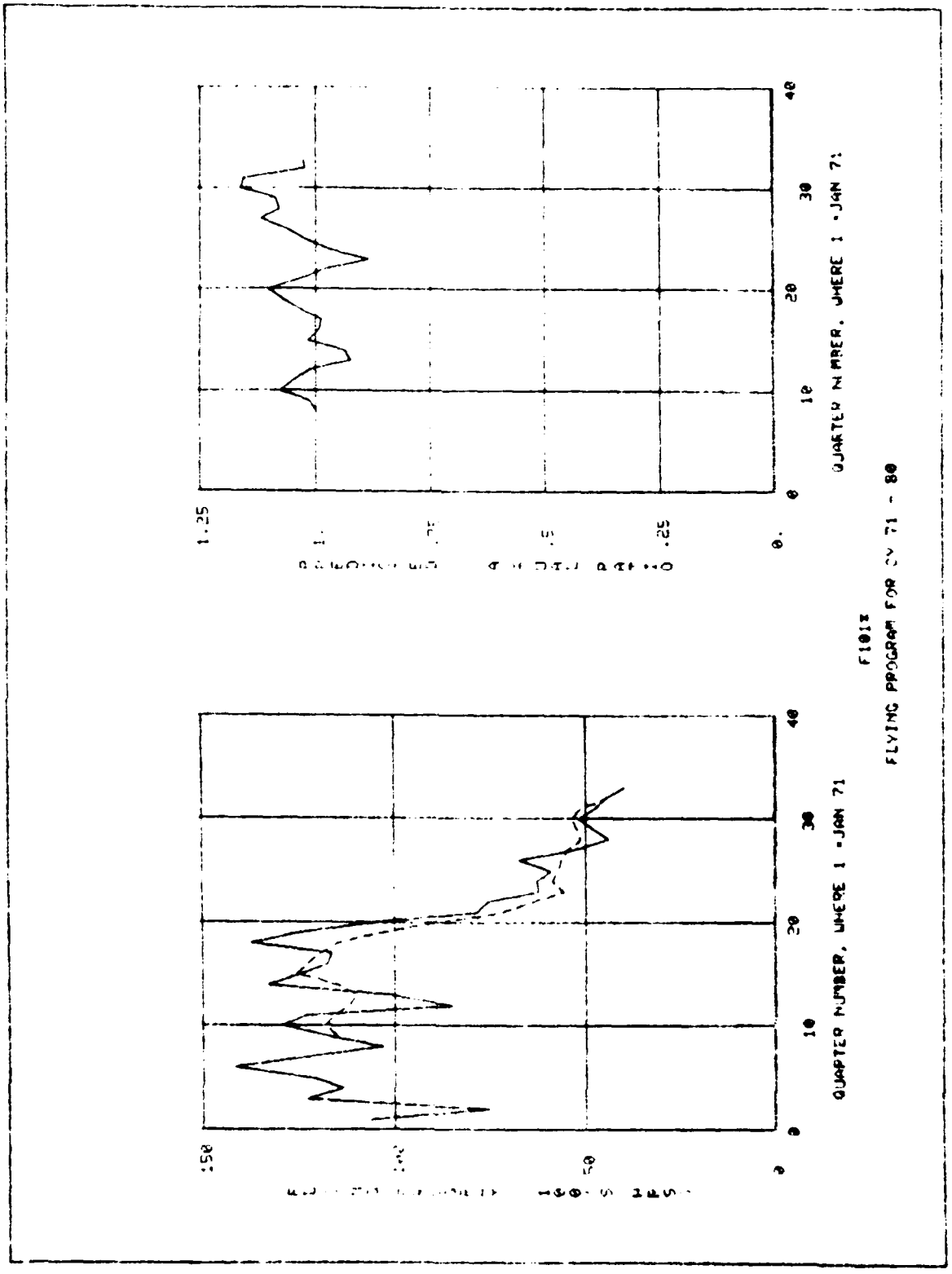
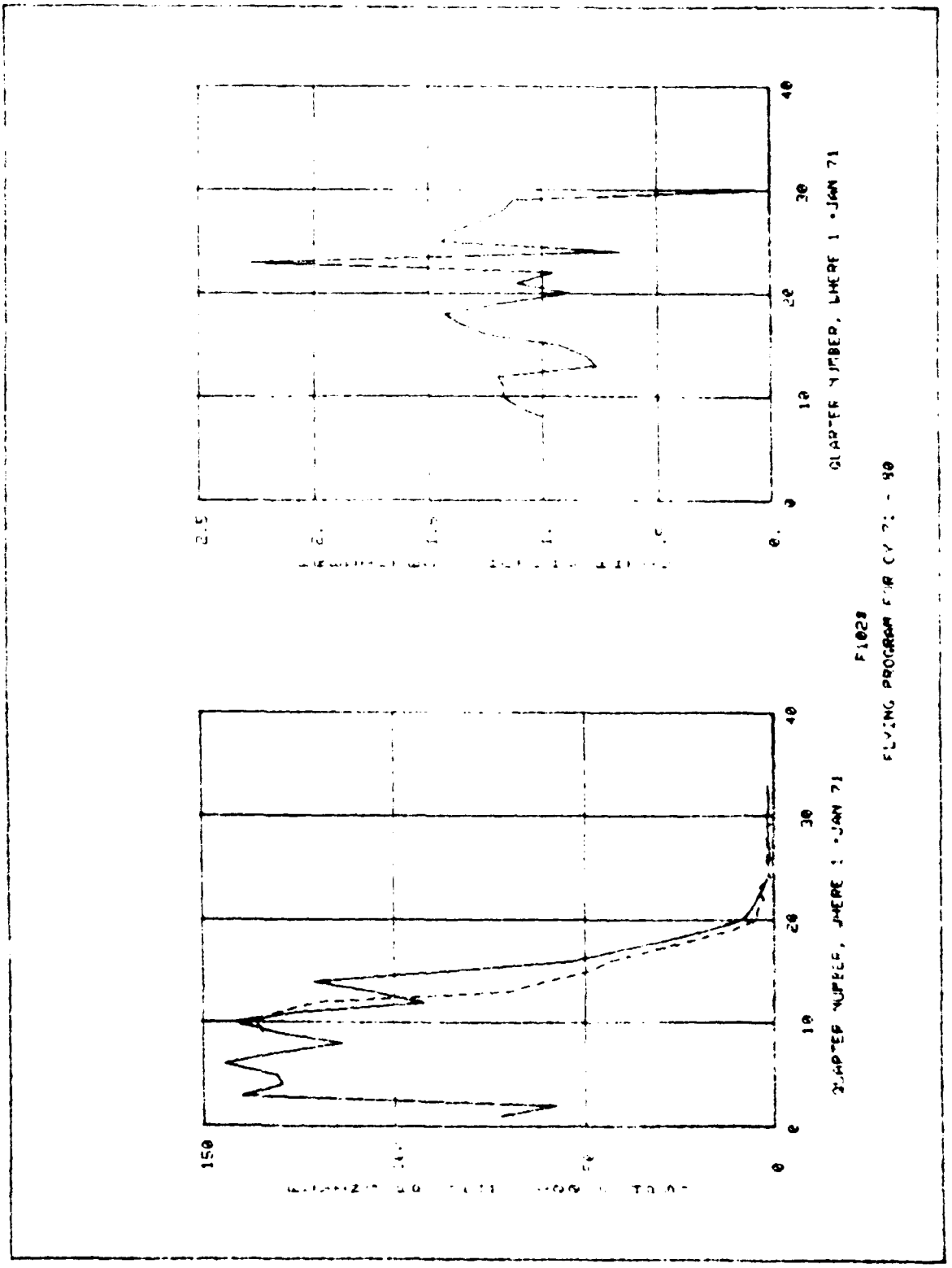


FIGURE 8
FLYING PROGRAM FOR CY 71 - 80

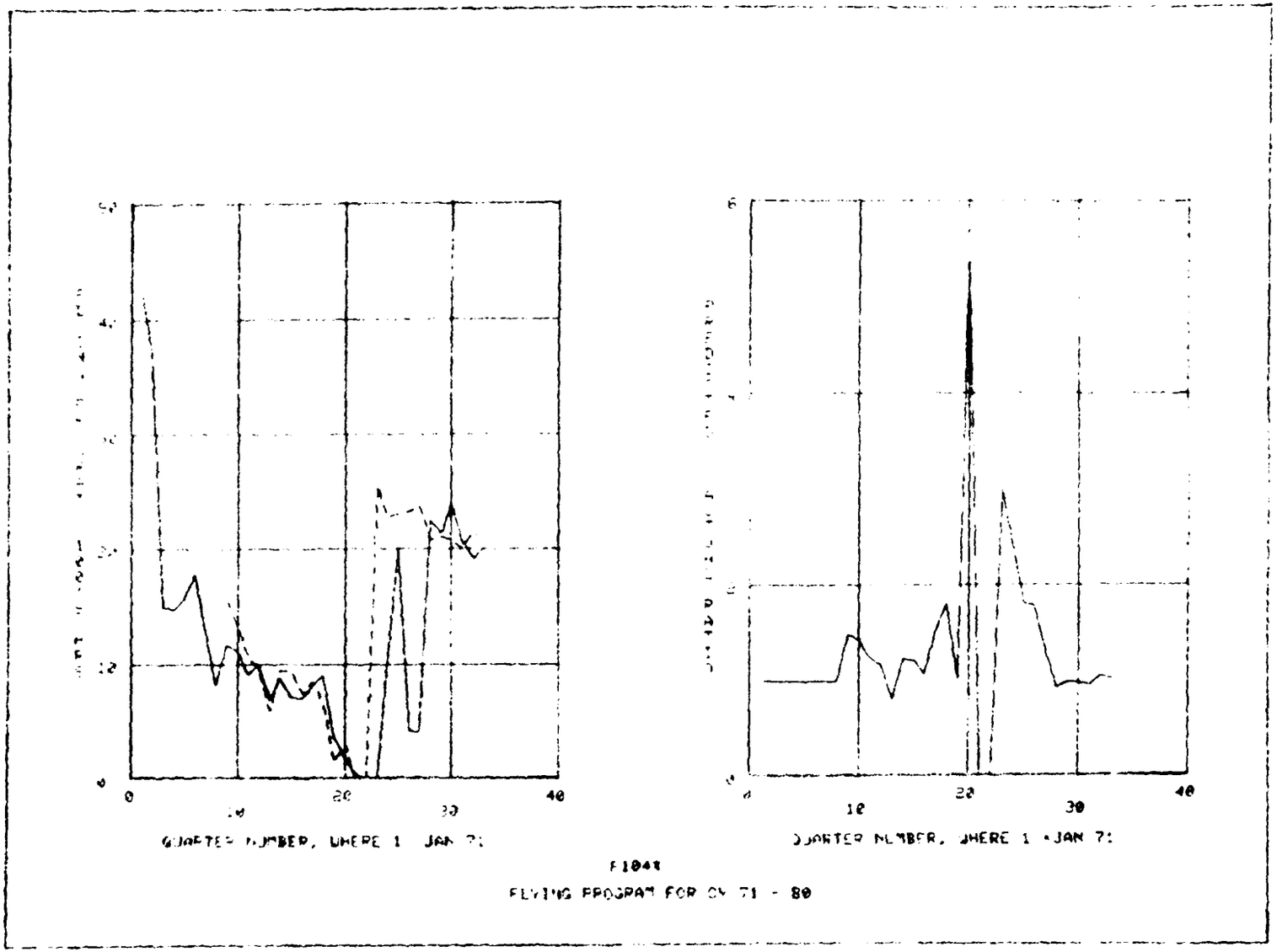


F101X

FLYING PROGRAM FOR CY 71 - 80



F1023
FLYING PROGRAM FOR CY 71 - 80



F1048

FLYING PROGRAM FOR CY 71 - 80

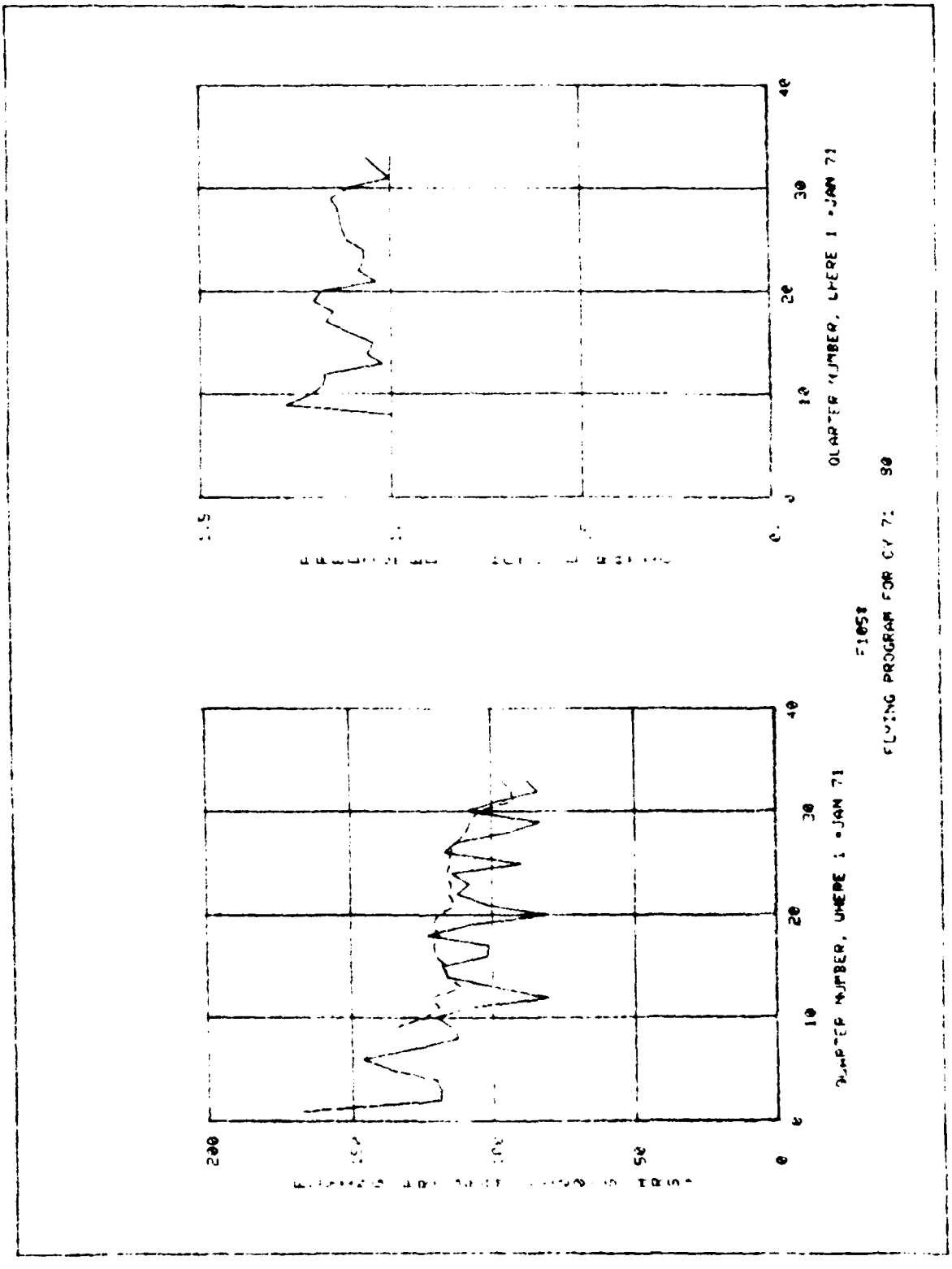


FIGURE
FLYING PROGRAM FOR CY 71 90

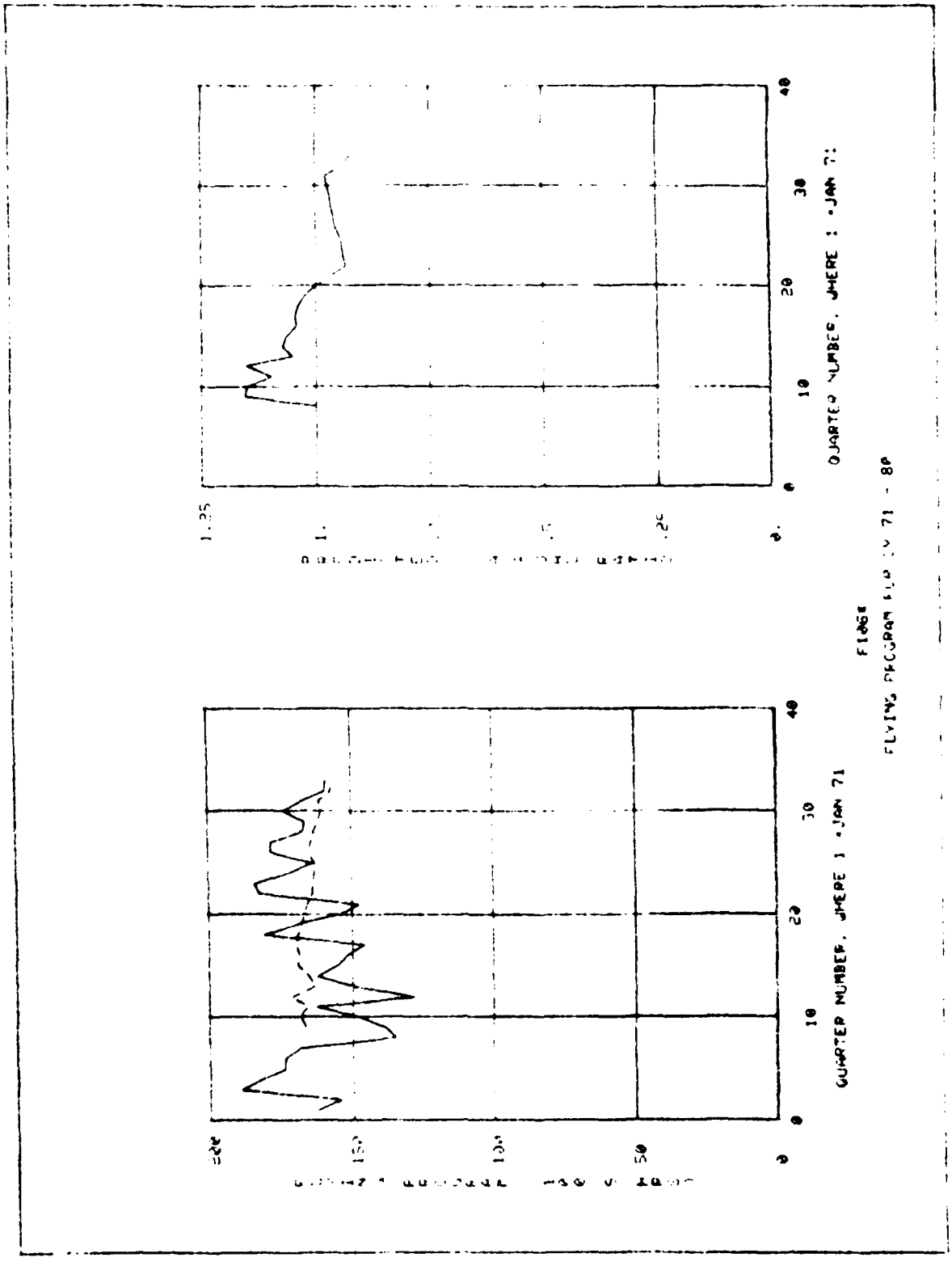
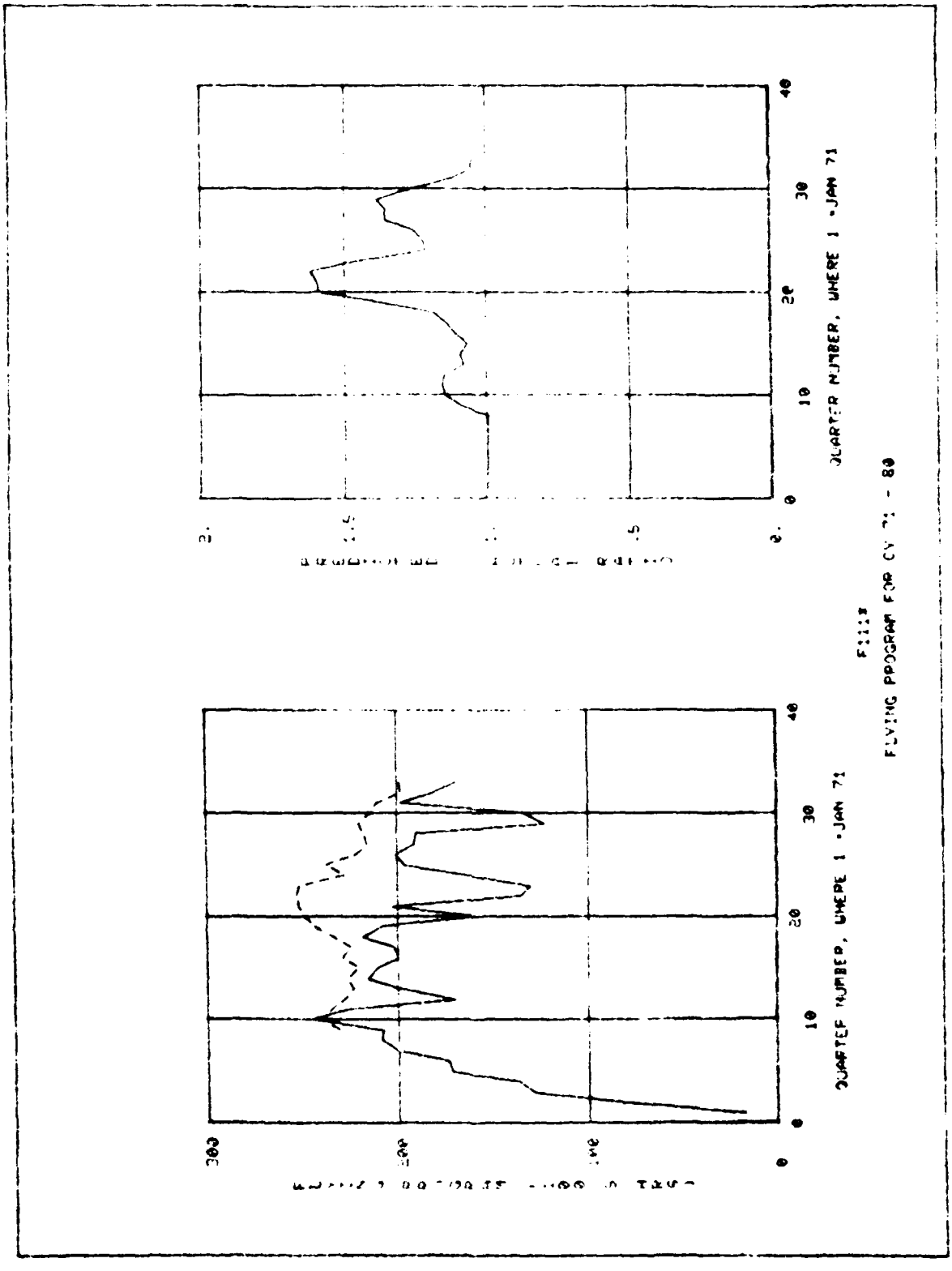
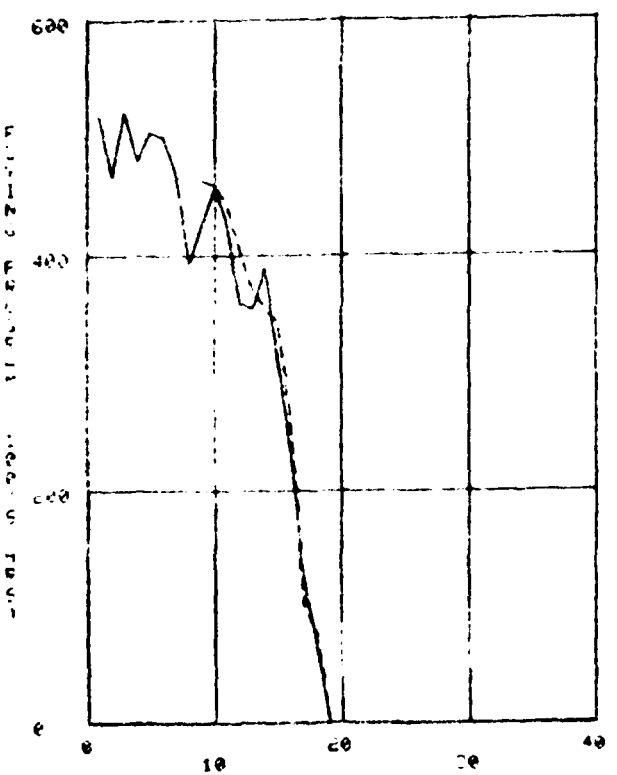


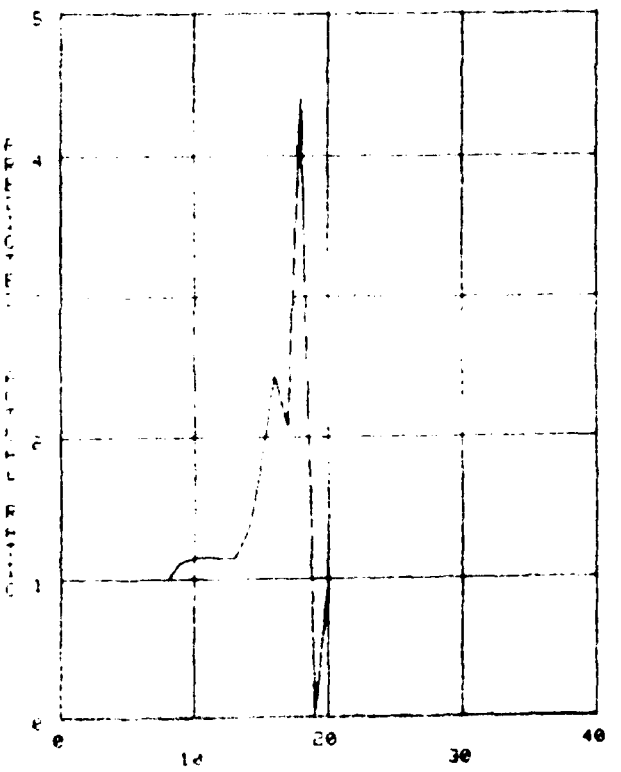
FIG6E
FLYING PROGRAM [illegible] 71 - 80



FLYING PROGRAM FOR CY 71 - 80



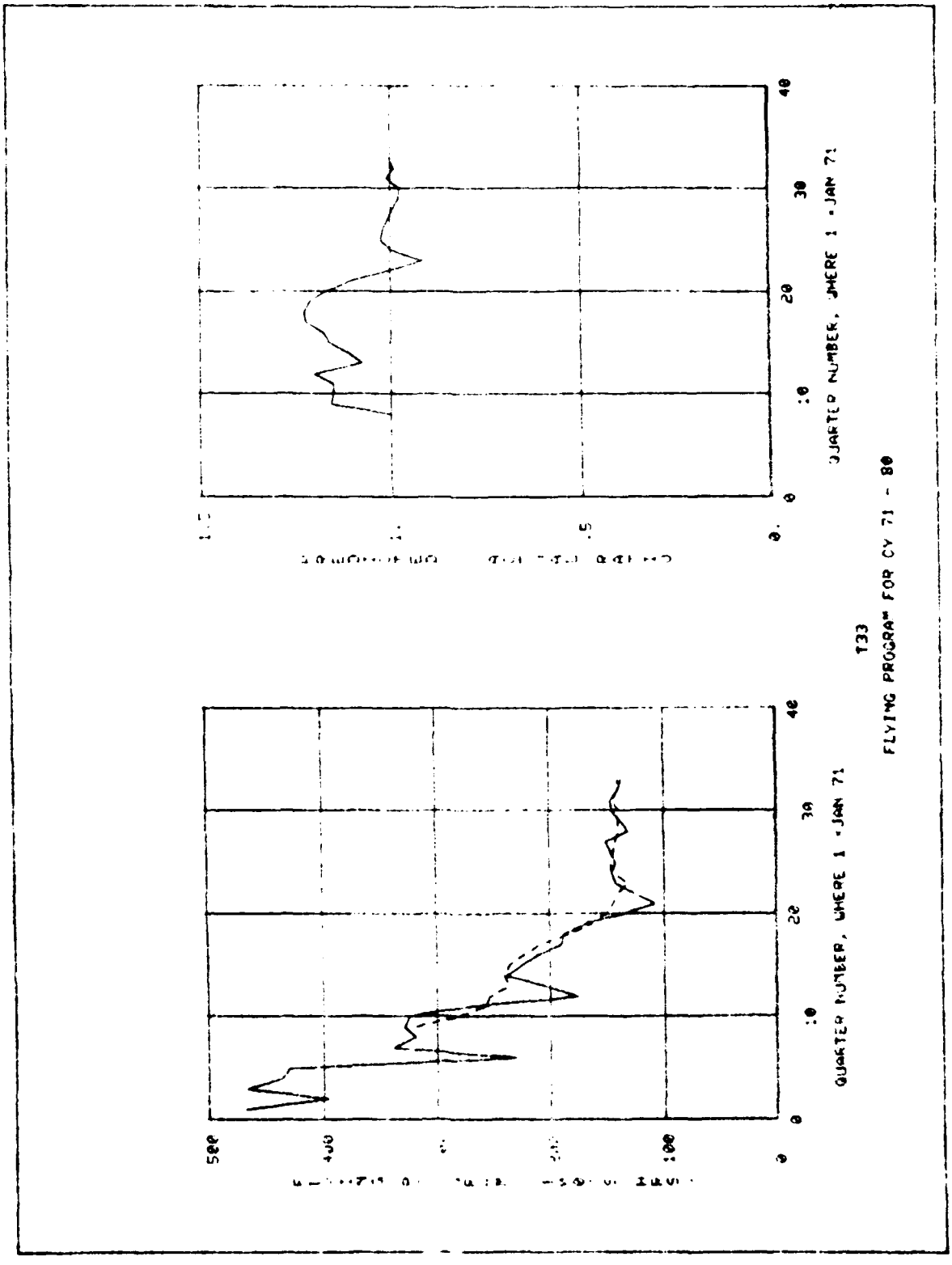
QUARTER NUMBER, WHERE 1 = JAN 71



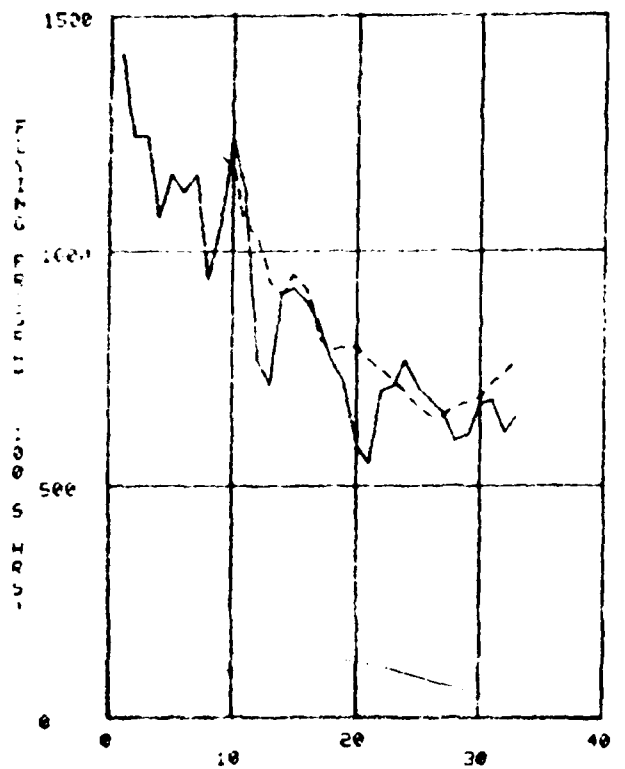
QUARTER NUMBER, WHERE 1 = JAN 71

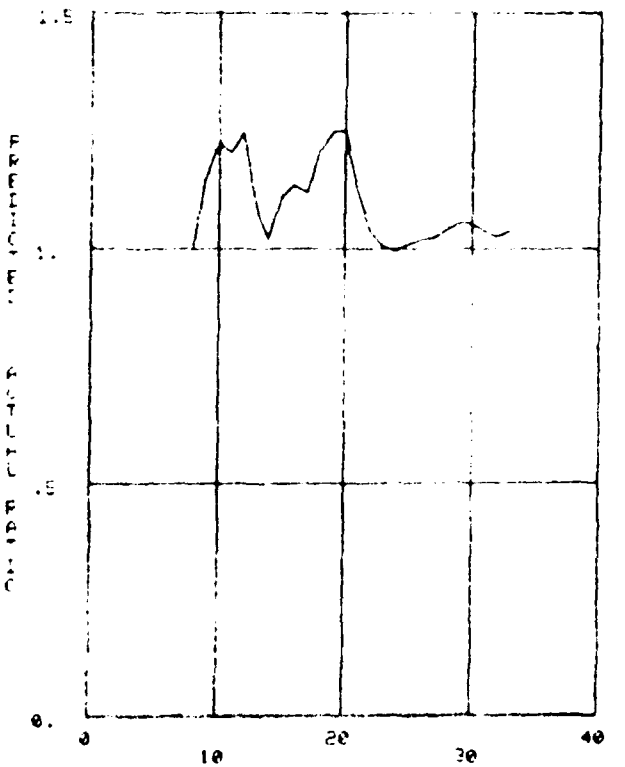
T29

FLYING PROGRAM FOR CY 71 - 80



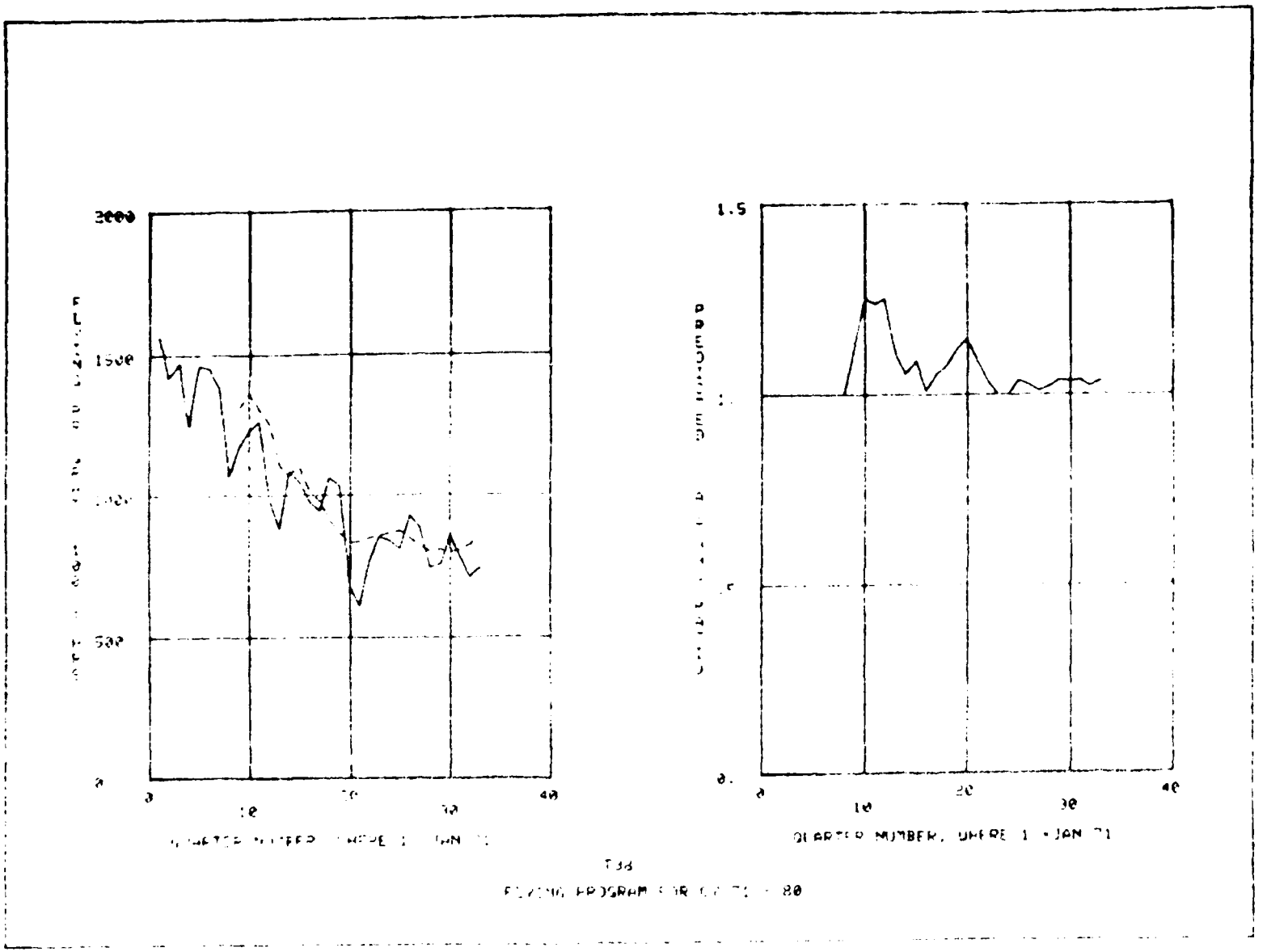
133
FLYING PROGRAM FOR CY 71 - 80





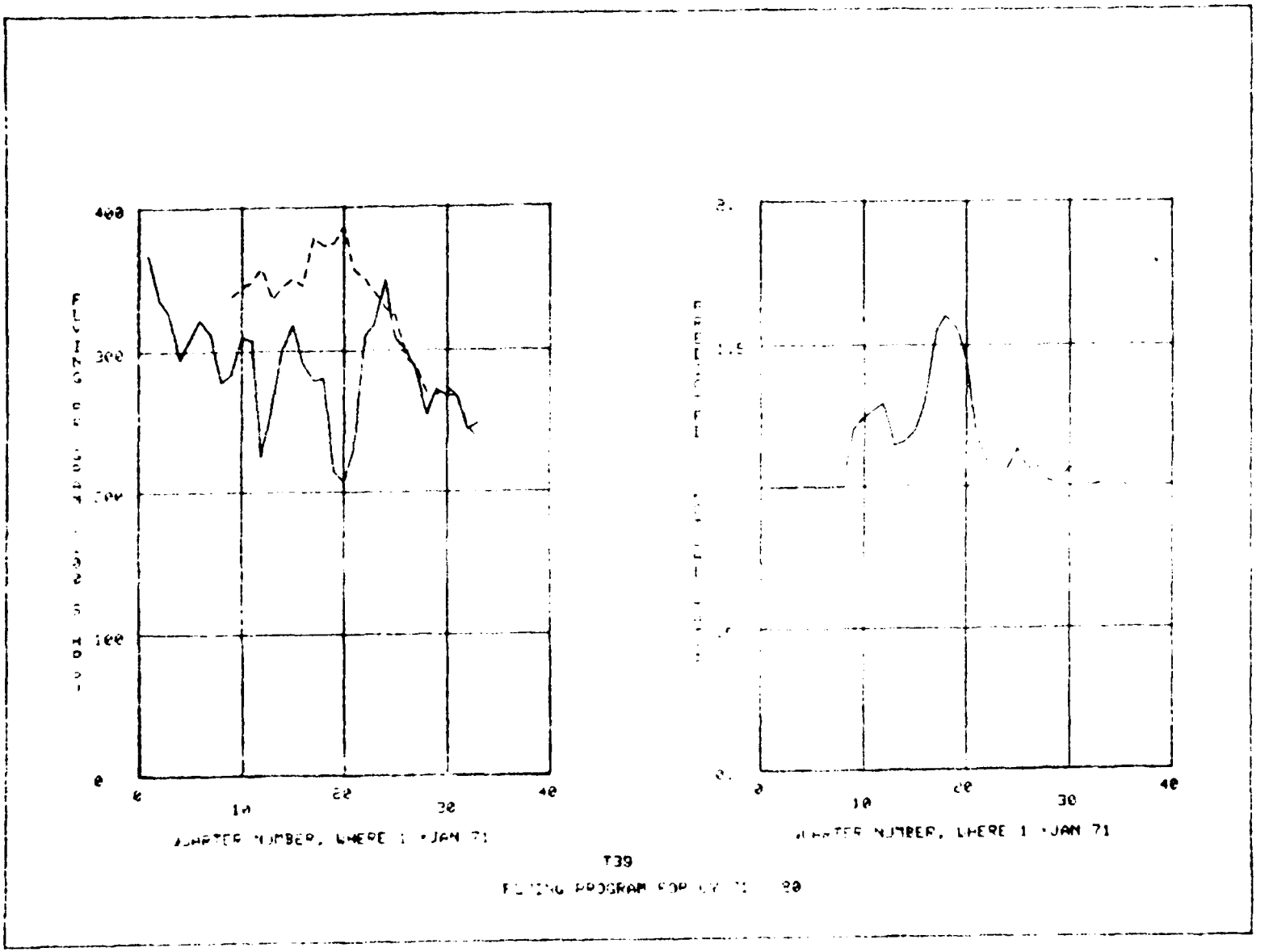
"37

FLYING PROGRAM FOR CY 71 - 80



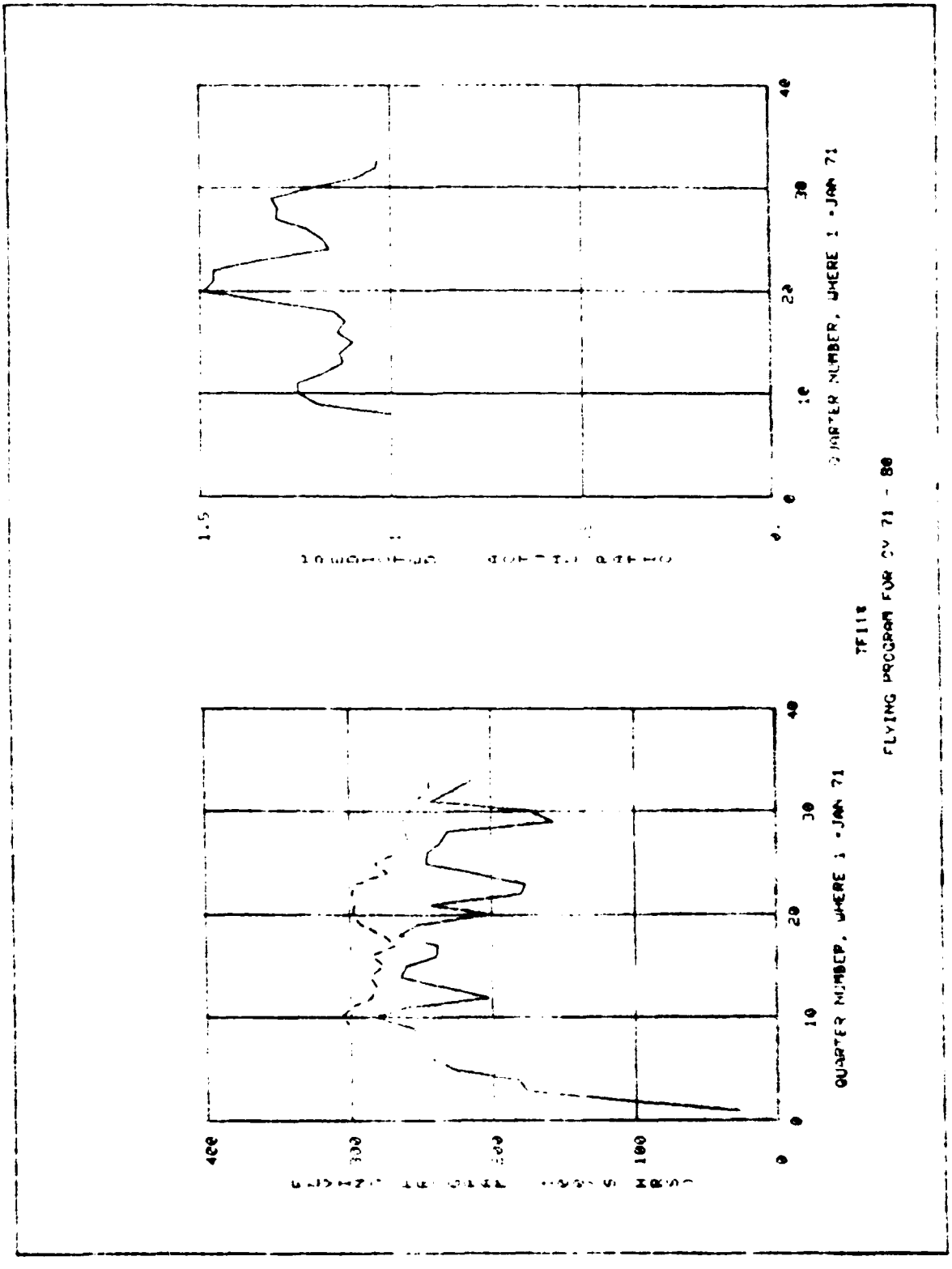
T38

FLYING PROGRAM FOR [illegible] 80

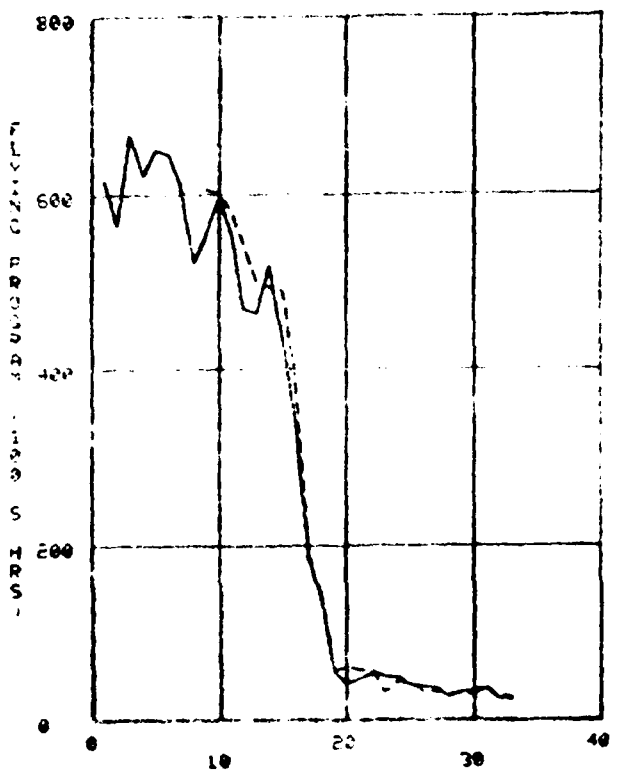


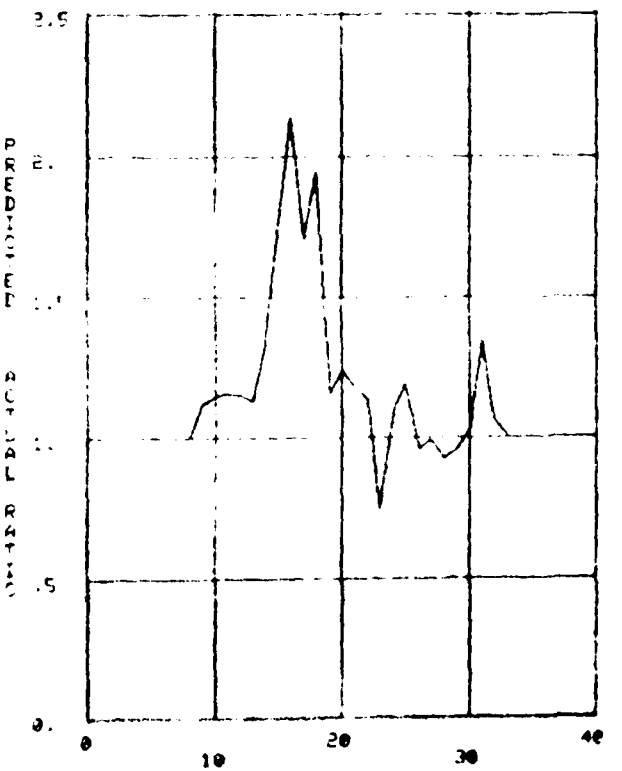
T39

FLYING PROGRAM FOR CY 71 - 80



TF118
FLYING PROGRAM FOR CY 71 - 80





CY293

FLYING PROGRAM FOR CV 71 - 80

Appendix B

Fortran Source Listings

of Tektronics Plot Programs

```
LIAR
COMMAND UNKNOWN
*LIST PRGERR.S

*$RUN$ACTFLY.D'08',R;PREFLY.D'09',R
*PRGERR.S-- COMPUTES ERRORS IN FORECASTS OF 1-YR FLYING PROGRAMS
C
C****NOTE---PFAC.D IS INSSIM PROGRAM FACTOR INPUT FILE.
C
      DIMENSION ACT(50),PRED(50),RATIO(50)
      CHARACTER AIRC1*5,AIRC2*5,FNAME*40
      CHARACTER WCODE*4
       DATA PRED 50*0.
      DATA RATIO 50*1.
C
C
C                 ACT(I)=ACTUAL FLYING HOURS IN QUARTER I
C
C                 PRED(I)=FORECAST OF FLYING HOURS FOR
C                        QUARTERS I TO I+3
C                        IN 100'S OF HOURS
C
C                 RATIO(I)=PROGRAM RATIO FOR QUARTER I,
C                  WHERE I=1 REPRESENTS 1ST QUARTER [illegible]
C
C    PRINT,[illegible] PROGRAM FORECAST ERRORS ARE PRINTED IN FILE [illegible]
C
C
     PRINT,[illegible]
     PRINT,[illegible] TO FILE 11? 1=YES'
      PRINT,'RATIOS [illegible]'
      [illegible]
C
C
C                 [illegible] AIRCRAFT [illegible]
C
       READ(8,1)LNO,FNAME
       IF(IOUT7.EQ.1)WRITE(7,11) 'ACTUAL PROGRAM FILE ',FNAME
     READ(9,13)LNO,FNAME
       IF(IOUT7.EQ.1)WRITE(7,11) 'PREDICTED PROGRAM FILE ',FNAME
       DO [illegible] N=1,100
C
C                 READ [illegible] PROGRAM FOR AIRCRAFT AIRC1
C                       FROM FILE 0[illegible]
C
       READ(9,13,END=3000)LNO,WCODE
       IF(IOUT7.EQ.1) WRITE(7,14)LNO,WCODE,(I,I=1,4)
  14   FORMAT(/T15,T30,'WEAPON CODE ',A4/' LINE  WEAP    YR',
      4(' QTR ',I3) )
       READ(8,13,END=3000)LNO,AIRC1,YR,(ACT(I),I=1,4)
       IF(IOUT7.EQ.1)WRITE(7,23)LNO,AIRC1,YR,(ACT(I),I=1,4)
   23 FORMAT(I5,2X,A5,F4.0,1X,4F10.2)
       DO 25 J=1,9
  33   FORMAT(/T30,'PREDICTED 1-YR PROGRAM',
              /' LINE  WEAP    YR',4('   QTR ',I3) )
       INDEX1=4*J-1
       INDEX2=4*J+4
       IF(J.GE.9)INDEX2=INDEX1
```

590 READ(8,13)LNO,YR,(ACT(I),I=

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IST 550

```
      READ(11,13)X(I),ACT(I),PRED(I),RATIO(I)
      IF(IDBUG.EQ.1) WRITE(6,53)X(I),ACT(I),PRED(I),RATIO(I)
 53     FORMAT(3F10.0,F10.3)
C
C           CONVERT PROGRAM TO 100'S OF HOURS
C
      ACT(I)=ACT(I)/100.
      PRED(I)=PRED(I)/400.
C
 5? CONTINUE
C
C           SET UP PLOT ARRAYS X AND Y
C
      NPLT = 3?
      [illegible]
      [illegible] NPLT-8
      [illegible] PLT
      [illegible] I
      X(I+NPLT)=I+8
      [illegible]
      [illegible] PRED(I+8)
C

 [illegible]
C
      [illegible]
      [illegible]
      CALL [illegible] 5.,45.,10.,80.)
      CALL [illegible]
C
C           SET UP LABELS AND SCALES FOR PLOT
C
      [illegible] LABEL',XLABEL)
      [illegible] LABEL',YLABEL)
      [illegible] 4.
C
      [illegible] LABEL [illegible]
      CALL USET([illegible] LABELS')
C
      CALL USET([illegible])
C
      OPTS(1) [illegible] LINE'
      OPTS(2) [illegible] DASH'
      CALL UPRINT(45.,8.,JSYS)
      CALL UPRINT(40.,5.,FLABEL)
C
      CALL UPLOT(X,Y,2.,PTS,OPTS)
C
C           PLOT PREDICTED PROGRAM
C
C
C           PLOT PROGRAM RATIOS
C
      CALL UPSET('YLABEL','PREDICTED / ACTUAL RATIOS')
      CALL UDAREA(55.,95.,10.,80.)
      CALL UPLOT(X,RATIO,1.,PTS,OPTS)
C
C
      CALL UAIN(CHAR)
C
C           PLOT PROGRAM RATIOS
C
C***************************END OF AIRCRAFT LOOP
C
      GO TO 10
  900 CONTINUE
C
      CALL UEND
      STOP
      END

ready
*
```


PRGERR,S, p 2
10/18/80
[illegible]

LIST PREDGERR.D 0. 0. 1.00

B52

1.	56364.	0.	1.000
2.	49052.	0.	1.000
3.	51442.	0.	1.000
4.	49486.	0.	1.000
5.	57675.	0.	1.000
6.	81035.	0.	1.000
7.	92746.	0.	1.000
8.	98288.	0.	1.000
9.	66370.	230800.	1.133
10.	[illegible]348.	211900.	1.220
11.	[illegible]	206200.	1.406
12.	68328.	[illegible]4900.	1.371
[illegible]	[illegible]409.	[illegible]800.	[illegible]
14.	[illegible]	[illegible]900.	1.219
15.	[illegible]	174000.	1.162
16.	38406.	162600.	1.127
17.	[illegible]4271.	151800.	1.097
18.	[illegible]	150400.	1.078
19.	[illegible]3996.	140[illegible]0.	1.041
20.	[illegible]48.	151[illegible].	1.133
21.	[illegible]415.	14[illegible]200.	1.067
22.	[illegible]553.	[illegible]200.	1.080
[illegible]	[illegible]	[illegible]	1.054
[illegible]	[illegible]	[illegible]400.	1.018
[illegible]	[illegible]	[illegible]900.	[illegible]
[illegible]	[illegible]	[illegible]800.	1.003
[illegible]	[illegible]47.	[illegible]	1.012
[illegible]	[illegible]	[illegible]	0.992
29.	[illegible]	[illegible]200.	1.061
30.	[illegible]308.	[illegible]	[illegible]
31.	[illegible]	[illegible]	[illegible]
32.	[illegible]239.	[illegible]	[illegible]
33.	[illegible]45.	[illegible]	[illegible]
34.	[illegible]	[illegible]	[illegible]
35.	[illegible]	[illegible]	[illegible]
36.	[illegible]178[illegible].	[illegible]	[illegible]
[illegible]	10526.	[illegible]	1[illegible].550
[illegible]	0.	[illegible]	1.000

ES

1.	[illegible]	0.	1.000
2.	[illegible]	0.	1.000
3.	3428.	0.	1.000
4.	3310.	0.	1.000
5.	3163.	0.	1.000
6.	7243.	0.	1.000
7.	5281.	0.	1.000
8.	4596.	0.	1.000
9.	5220.	25500.	1.371
10.	5256.	25500.	1.529
11.	5313.	18800.	1.354
12.	2745.	21200.	1.651
13.	3259.	12900.	2.326
14.	3573.	14600.	1.054
15.	3528.	17700.	1.201
16.	3477.	17300.	1.205
17.	3279.	17600.	1.281
18.	4453.	16800.	1.272
19.	3643.	16700.	1.319
20.	2358.	16700.	1.232
21.	2745.	16500.	1.212
22.	3913.	16600.	1.181
23.	4539.	16500.	1.150
24.	[illegible]	15[illegible].	[illegible]
25.	3193.	15200.	1.032
26.	4200.	14800.	1.011
27.	3896.	14700.	1.091
28.	3358.	13800.	1.095
29.	3187.	13700.	1.120
30.	3030.	[illegible]	[illegible]
31.	3031.	14000.	1.182
32.	2975.	14000.	[illegible]
33.	2625.	12400.	1.379
34.	3308.	10800.	1.576
35.	1663.	6600.	1.810
36.	1496.	6600.	3.[illegible]28
37.	487.	6600.	13.552
38.	0.	6600.	1.000

[illegible]134

1.	[illegible]	0.	1.000
[illegible]	[illegible]	0.	1.000
[illegible]	[illegible]	[illegible]	[illegible]
4.	[illegible]	0.	1.000
5.	[illegible]	0.	1.000
[illegible]	[illegible]484.	0.	1.000
[illegible]	[illegible]	0.	1.000
8.	[illegible]	0.	[illegible]
9.	14[illegible].	[illegible]	1.150
10.	14871.	[illegible]	[illegible]
11.	14060.	[illegible]9000.	[illegible]
12.	11[illegible].	[illegible]	[illegible]
13.	10657.	[illegible]7400.	1.278
14.	[illegible]73.	[illegible]	1.326
15.	11865.	56500.	1.622
16.	10650.	47[illegible].	2.002
17.	7651.	17500.	1.340
18.	4[illegible].	7400.	1.233
19.	561.	1700.	1.264
20.	316.	1700.	1.805
21.	374.	1100.	1.644
22.	[illegible]4.	900.	2.624
23.	158	800.	2.273
24.	63.	300.	3.524
25.	48.	300.	4.879
26.	83.	300.	2.556
27.	33.	0.	0.
28.	0.	0.	1.000
29.	0.	0.	1.000
30.	0.	0.	1.000
31.	0.	0.	1.000
32.	0.	0.	1.000
33.	0.	0.	1.000
34.	0.	0.	1.000

PRGERR.D DATA FILE [illegible]

```
$ST PRGERR.F

$$RUN$HEDG/PRATIO.D'11',R
C$PRGERR.F
$
$     THIS PROGRAM READS FLYING PROGRAM DATA FROM FILE 11,
C       AND THEN GIVES COMMANDS TO PLOT THE DATA USING
C       THE TECKTRONICS PLOT TERMINAL.
C
      CHARACTER XLABEL*40,YLABEL*40
      CHARACTER FLABEL*40
        DATA XLABEL 'QUARTER NUMBER, WHERE 1 = JAN 71'/
      DATA YLABEL/'FLYING PROGRAM (100's HRS)'/
      DATA FLABEL/'FLYING PROGRAM FOR CY 71 - 80'/
C
      CHARACTER JAYS*6 [?]
       DIMENSION X(100),ACT(50),PRED(50),RATIO(50)
      DIMENSION Y(100)
      CHARACTER OPTS*4(3)
      CHARACTER CHAR*1
      DIMENSION PTS(3)
      DATA PTS [illegible]
C
      [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
          [illegible] TO MARK ONE OF TEXT DATA [illegible]
[illegible]
C
      [illegible]
   C  FORMAT TA,A1 [?]
C
      IF IDBUG.EQ.1 WRITE 6,33 [illegible]
   33 FORMAT [illegible] T5,A6 [?]
C
      [illegible]
C
C           READ NO QTRS OF DATA, WITH
C              X(I)  = QTR NO. = I
C             ACT(I) = ACTUAL PROGRAM THAT QTR.
C            PRED(I) = PREDICTED PROGRAM IN NEXT 4 QTRS.
C           RATIO(I) = RATIO OF PREDICTED TO PAST 2 YRS
C       NPRT = NO. OF POINTS TO BE PLOTTED
C
      NPRT = NQ
      OPTS(1)='LINE'
      OPTS(2)='DASH'
      CALL UPSET('SETDASH',32.)
C
C
      DO 59 I=1,NQ
       READ(11,53)X(I),ACT(I),PRED(I),RATIO(I)
        IF IDBUG.EQ.1 WRITE 6,53 X(I),ACT(I),PRED(I),RATIO(I)
   53     FORMAT 3F10.0,F10.3)
C
C             CONVERT PROGRAM TO 100 S OF HOURS
C
        ACT(I)=ACT(I)/100.
        PRED(I)=PRED(I)/400.
   59 CONTINUE
C
C             SET UP PLOT ARRAYS X AND Y
C
       NPLT = 33
        PTS(1)=NPLT
       PTS(2)=NPLT-8
        DO 75 I=1,NPLT
        Y(I)=I [?]
        X(I+NPLT)=I+8
        Y(I)=ACT(I)
        Y(I+NPLT)=PRED(I+8)
C
C
   75 CONTINUE
C
        CALL USET [illegible]
        CALL USET [illegible]
        CALL UDAREA( [illegible] 10.,80.)
        CALL [illegible]
C
C             SET [illegible] FOR PLOT
C
        CALL UPSET('XLABEL',XLABEL)
        CALL UPSET('YLABEL',YLABEL)
        CALL UPSET('TICX',4.)
C
        CALL USET [illegible]
        CALL USET [illegible]
C
        CALL USET [illegible]
C
        OPTS(1)='LINE'
        OPTS(2)='DASH'
        CALL UPRINT(45.,3.,[illegible])
        CALL UPRINT(42.,5.,FLABEL)
C
         CALL UPLOT(X,Y,2.,PTS,OPTS)
C
C              PLOT PREDICTED PROGRAM
C
C
C              PLOT PROGRAM RATIOS
C
         CALL UPSET('YLABEL','PREDICTED - ACTUAL RATIO')
         CALL UDAREA(55.,95.,10.,80.)
         CALL UPLOT(X,RATIO,1.,PTS,OPTS)
C
C
         CALL LAIN(CHAR)
```

PRGERR.F p.1
[illegible]

```
LIST 1130

1130      CALL MAIN(CHAR)
1140C
1150C            PLOT PROGRAM RATIOS
1160C
1170C**********************END OF AIRCRAFT LOOP
1180C
1190       GO TO 10
1200   300 CONTINUE
1210C
1220      CALL UEND
1230          STOP
1240          END

ready

*
```


PRGERR.1 P
6/1/80


DATE
ILME